















# PRINCIPLES AND METHODS OF TEACHING

A MANUAL FOR NORMAL SCHOOLS, READING  
CIRCLES, AND THE TEACHERS OF ELEMEN-  
TARY, INTERMEDIATE, AND  
HIGHER SCHOOLS

BY

CHARLES C. BOYER, PH.D.

PROFESSOR OF PEDAGOGICS, KEYSTONE STATE NORMAL SCHOOL, KUTZ-  
TOWN, PA., AND AUTHOR OF "CONCRETE PSYCHOLOGY,"  
"PSYCHIC INITIATIVE IN EDUCATION," ETC.



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## PREFACE.

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THE art of teaching should have its foundations in science ; for then and only then will teaching cease to be mechanical obedience to "authority." Such obedience was the curse of the "old" education. "Tradition" and "prescription" determined the methods not only in oriental systems of education, but also in the later civilizations of Europe. The principle of authority has not wholly disappeared from modern school-rooms. Rational methods of teaching, indeed, are the exception rather than the rule in the great mass of American teachers.

The individual teacher must have part in the construction of the science in which his art is to have its foundations. Otherwise the "new" education will simply substitute one tyrant for another. In other words, obedience to principles of philosophy, though it be the best philosophy, is only slavery as long as the teacher who submits to such laws cannot justify these in his own consciousness.

The great mass of teachers is not equal to the task of constructing the complex science of education independently. This task implies not only analytic knowledge of human nature in its manifold relations, but also the power of synthetic thought. The great body of teachers, therefore, need supervision in constructing their system of educational principles. It is hoped that the plan of the present treatise may supply at least a portion of the needed supervision.

In complexity of "thought" and "language," the needs of the general reader as well as those of Normal Schools and Col-

leges were kept in mind. The psychological analyses and inductions, and all derivatives, have been adapted in vocabulary and composition to the ordinary reader, while the systematic thinking required throughout the book will employ the best powers of readers of higher attainments.

The cyclopedic scope of the treatise is justified by the cyclopedic courses of study in our common schools. Experience shows that it will not suffice to train teachers in the principles and methods of a few branches with the hope that they will then know how to proceed in the other branches. This discovery should not surprise us ; for, although the development of knowledge is generically the same in all departments of study, the individual features of the various studies require special modifications in the methods of their development.

It is hoped that the plan of this treatise may commend itself to the judgment of teachers.

(1) The nature of man, especially the psychical processes and principles, is made the first subject of inquiry.

(2) The conclusion that education should consist of such development of man's possibilities as best fit him for complete living seems unavoidable.

(3) The essential features of this ideal development of man are exhibited in the chapter on the nature of education, and a synthesis of these views is found in the general principles of education.

(4) The principles of culture, knowledge, and instruction are deductions from the general principles of education, as confirmed inductively by the history of education.

(5) The proposed *methods* of culture and instruction are practical deductions confirmed by the experience of the best teachers. Special attention is called to the proposed science-method of instruction, *i.e.*, the development of all branches by observation, induction, and deduction, the ideal succession of mental activities. It is believed that, all other things equal,

the teacher who catches the spirit of this method will work the most intelligently and obtain the most satisfactory results. The history of education in Germany, France, and parts of America clearly confirms this conclusion.

For extensive treatment of the science of education the reader is respectfully referred to such standard works on teaching as Rosenkranz's "Philosophy of Education," and Tompkins' "Philosophy of Teaching," to which this treatise is designed to be a stepping stone, and with whose theories American teachers are happily becoming better acquainted. Grateful acknowledgment is here made to the various inspiring writers consulted and quoted by the author.

This book is humbly dedicated to the teachers of our country, with the sincere hope that it may be of service to them and their pupils, and to the cause of education in general.

CHARLES C. BOYER.





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PRINCIPLES AND METHODS  
OF TEACHING.

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PART I.  
PSYCHOLOGY.



# PRINCIPLES AND METHODS OF TEACHING.

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## INTRODUCTORY.

IN teaching, it is true, we have to do with the pupil's body as well as with the mind. Our present purpose forbids extended reference to physiology, with which we must therefore assume that the reader is familiar. Pedagogics, however, consists so largely of psychology, and teachers are so generally in need of a compact restatement of the fundamental truths of psychology, that a chapter on this subject is indispensable in a treatise on pedagogics. The teacher of pedagogics should, accordingly, assure himself that his students understand (1) The Method of Psychology, (2) Mental Activity, and (3) The Laws of Mental Activity.

## THE METHOD OF PSYCHOLOGY.

In psychology the student (1) observes his own mental experiences or those of other minds, (2) regards these experiences as individuals of a genus, and (3) confirms these hypotheses by variations in numerous experiments. In other words, the process of psychology consists of (1) the observation of mental phenomena, and (2) the ascertainment of their laws by induction and deduction. The present chapter is designed to prompt exercises in this method of discovery. The student must, of course, be wisely supervised.

## CHAPTER I.

## MENTAL ACTIVITY.

THE phenomena with which the self-observing mind meets are not a classified collection of distinct elements, but rather a mass whose elements must be discovered by analysis. The mass, as the self-observing mind discovers by analysis, consists of a synthesis of distinct elements; but the order in which these elements become distinct depends, of course, on the individual observer, the time of his observations, the predominance of some elements over others at the time of observation, etc. If, however, these elements became distinct to the observer in their necessary order of dependence, as appears from subsequent inquiry into the nature of these elements, they would present themselves to the observer somewhat as follows: (1) Sensation, (2) Ideation, (3) Relation and Emotion, and (4) Volition.

## I. INTELLECT.

The phenomena of sensation, ideation, and relation, as will appear in the sequel, deserve our attention under the head of Intellect.

**Sensation.** The observing mind discovers variations in its phenomena corresponding to the variations in its physical environment. These variations, as physiological psychology teaches, are the "affects" of "impresses" on the "end-organs" of the "sensorium," and are termed Sensations. In other words, "Any mental state upon the basis of which the mind obtains a knowledge of the world around it," is termed a Sensation.

**Ideation.** Mental "images" of the external or internal "objects" for which mental data stand, are termed *Ideas*, and the process of forming ideas is termed *Ideation*. The process,

as further analysis will show, begins in sense-presentation ; analysis and synthesis follow. In all phases of ideation the mind only "posits" objects without dwelling on likeness, difference, necessity, etc. In other words, there is no "copula" in ideation. The copula, as we shall see, forms "thoughts" out of ideas. This distinction, since its description is so difficult, should be illustrated by means of logical "propositions," in which "ideation" and "copula" (relation) are respectively the initial and final necessities. The various phases of ideation, as already intimated, are as follows :

*Perception.* The mind observes repetition of sensations in the repetition of external impresses, and thus learns to refer sensations to such impacts as *causes*. In this way sensations become "data" by means of which the mind identifies its whereabouts in *space* and *time*. It is not only through the special sense organs, as the eye or ear, that we obtain a knowledge of physical environment, but also through all the other species of sensation of which man is capable. The complex phenomenon in question is termed Perception. In other words, *The process of referring sensations to physical impacts as causes, is termed Perception.* The term is derived from the Latin words *per*, by means of, and *cipio*, I take hold of. The mental results thus obtained are termed Percepts.

*Memory.* Sensations, and, as physiological psychology teaches, *all* mental experiences, inasmuch as in the present junction of body and mind they are inseparable from simultaneous sensations, leave association tracks or paths in the neural apparatus. By means of these associations the mind revives and recognizes its experiences. This complex phenomenon is termed Memory ; the later "editions" of mental experiences thus obtained are termed Memories. In other words, *The process of retaining, reviving, and recognizing mental experiences is termed Memory.* The tendency of definite and frequent associations to persist, is termed Habit, or

**Retention.** Voluntary memory is termed Recollection. The essential element of memory as mental phenomenon is Recognition, *i.e.*, the knowledge that what has come back is a later edition of our own mental experiences.

**Imagination.** In perception the mind comes into actual contact with realities; in memory past realities are represented with great fidelity. Since, as physiological psychology teaches, the cortical tracts of perception and memory are the same, any stimulation of these tracts, whether the origin of the stimulus be within the mind itself or in the sensorium, will produce a semblance either of perception or of memory. (1) The primary phase of imagination, as in illusions and dreams, resembles perception and memory very closely. In the effort to construct historical and fictitious events, etc., imagination becomes a mental substitute for perception. (2) In its second phase, as in the mental projection of lines, and the construction of wholes, etc., imagination is mental emancipation from the perception-limits of space and time, and from the normal correlation of parts, epochs, etc. Thus imagination becomes a supplement of perception and the means of mental transition from the real to the possible, etc. (3) In the third phase of imagination the mind, in obedience to the stimulus of æsthetic, moral, or philosophic abstractions, forms "new combinations" out of materials furnished by perception and memory, but always in terms of perception, as in the conceptions of artists, moralists, scientists, and inventors. The process in question, in all its reproductive and productive, voluntary and involuntary phases, is, as appears, really "*representative*," although as to its perfection the representation may vary from the faintest resemblance to perception or memory to infinite extensions. This process of apprehending possibilities suggested by experienced realities is termed Imagination, from the Latin word *imago*, copy or likeness. In short, *The apprehension of possibilities as perceptions is termed Imagination.*



*Abstraction.* Qualities, as physiological psychology teaches, first become the object of thought in perception and self-consciousness. Our first ideas of brittleness, beauty, right, and truth, for example, are formed in the perception or consciousness of things that suggest these ideas to the mind. The ideas thus formed are termed "concrete," from the fact that they are formed without dissociating the qualities from the things to which they belong. It is, however, possible to make qualities the object of thought without reference to the things in which they are found by perception and introspection. It is thus that we may think of brittleness, beauty, right, and truth, without reference to things which suggest these ideas to the mind. The æsthetical, ethical, and philosophical distinctions, *i.e.*, those of beauty, morality, and truth, generally appear later and mature more slowly than the other distinctions now under consideration. The mental process in question is termed Abstraction, from the Latin words *abs*, from, and *traho*, I draw. In short, *The process of dissociating qualities as objects of thought is termed Abstraction.* The peculiarities of several of these abstract distinctions, especially their distance from the concrete, and their universality, led the "older" psychologists to classify them separately as "intuitions," from the Latin words *in*, into, and *tueor*, I see. The "new" classification simplifies matters without injustice to truth. The power of æsthetic abstraction is termed Taste, and that of moral abstraction is termed Conscience. The æsthetic and moral distinctions, *i.e.*, those of "beauty" and "right," generally appear somewhat later and mature more slowly than other abstract distinctions.

*Generalization.* Our first ideas of things, as apples, horses, government, etc., are percepts, as already shown. Two species of synthesis follow: (1) The mind discovers that some of the individuals of perception, memory, etc., have common properties. Apprehending these common properties in successive

abstractions, and synthesizing the successive impressions into mental wholes, the mind forms object-concepts, as recorded in common nouns. It is in this way that our idea of a house, book, or bell, develops with our experience. (2) The mind also discovers varieties of the same quality, as sweetness, in otherwise dissimilar individuals, as sugar, apples, dispositions, etc. Apprehending these varieties of the same quality in successive abstractions, and synthesizing the successive impressions into mental wholes, the mind forms quality-concepts, as recorded in abstract nouns.

A collection of similar individuals (objects or qualities) is termed a Genus. Object-concepts and quality-concepts, as recorded respectively in common and abstract nouns, may therefore be termed General Ideas, and the process of synthesis in which they originate may be termed Generalization. The great Herbart preferred the term Apperception, from the belief that all concepts are derived from perception. In short, *The synthetic enlargement of ideas is termed Generalization.*

*Consciousness.* Of its own states and acts the mind is aware somewhat in the same sense as the world without us appears to the senses. In the phenomenon in question the mind becomes its own "object of thought," very much as a plant is made an object of perception. This process of introspection is termed Consciousness, from the Latin words *con*, at the same time, and *scio*, I know. Children, as experiments prove, are for months only indefinitely conscious of the "self" of consciousness. It is only by and by that the child learns to distinguish "self" sharply from "other." Ordinarily the untutored adult observes his own states and acts as little as the novice in botany observes the flowers at his feet. The tutored mind not only knows that "self" is the "object of thought" in consciousness, but observes its own acts and states as the botanist observes flowers, *i.e.*, critically, in order to

ascertain properties and relations. Voluntary consciousness is the primary source of information in the "mental" sciences. (See the chapter on Knowledge.) Abstraction and generalization follow consciousness very much in the same way as they follow the process of perception. In short, *The process of introspection by which the mind becomes aware of its own states and acts, is termed Consciousness.*

**Thought.** The mental processes of which the various species of "sentences" are expressions, are evidently arrangements of ideas rather than formations of ideas. The mental activity in question resolves itself into two species.

**Judgment.** In the act of judgment, as expressed in a logical proposition, the mind passes from one object of thought to another to ascertain their agreement or disagreement, as when we estimate length, weight, worth, etc. The process is often termed Direct Comparison. It is termed "direct" comparison because in the act of judgment only two objects of thought are in question. The term "comparison" is derived from the Latin words *con*, with, and *par*, equal. Accordingly, *The process of passing from one object of thought to another to ascertain their agreement or disagreement, is termed Judgment.*

As soon as, in the course of our comparisons, we find a number of similar individuals we group them on the ground of such similarity. Sorting books, plants, insects, actions, etc., illustrates the process, which, whether it be only mental or also physical, is termed Classification. In "common" classification physical properties are the bases of judgment, as in the arrangement of books in a library; in "scientific" classification the relations ascertained by complete induction are the bases of judgment, as in Natural History. In short, *The process of grouping individuals on grounds of resemblance, is termed Classification.* (1) Progressive classification, *i.e.*, the formation of groups of individuals, as in addition, multiplication, and the constructing of a sentence, is termed *Synthesis*, from the Greek

words *syn*, together, and *tithemi*, I put. (2) Regressive classification, *i.e.*, the isolation of individuals that compose a class, whole, or genus, as in subtraction, division, and the separating of a sentence into its component parts, is termed *Analysis*, from the Greek words *ana*, up, and *luo*, I break.

*Reasoning.* The formation of judgments, *i.e.*, the process of relating ideas, is termed Thinking, or Thought. "Thoughts" may in turn become the "object of thought," *i.e.*, the process of relating ideas may be indirect as well as direct. This process of thinking is termed Reasoning. In short, *The process of indirect judgment is termed Reasoning.* The process in question resolves itself into two species.

(1) The process of reasoning from a particular judgment, *i.e.*, a judgment concerning individuals, to a general judgment, *i.e.*, a judgment concerning a genus, is termed Induction. The following combination of thoughts illustrates induction: The sum of the angles of this triangle is two right angles; the same thing is true of all *observed* triangles; therefore, the sum of the angles of any triangle is two right angles.

(2) The process of reasoning from a general to a particular judgment is termed Deduction. The following combination of judgments illustrates deduction: The sum of the angles of any triangle is two right angles; *abc* is a triangle; therefore, the sum of its angles is two right angles.

The common idea of two associated judgments is known in logic as the "middle" term. The word *triangle* in the first two judgments of the above illustrations names the middle term, and is itself often called by that name. Two judgments that have a "middle term" are known as "related" judgments, as in the illustrations. Two judgments so related that a third judgment grows out of their relation, are termed Premises, from the Latin words *pre*, before, and *mitto*, I send. (See the illustrations.) The consequence of the relation of two judgments is termed the Conclusion, from the Latin words *con*, together,

and *cludo*, I close. (See illustrations.) The derivation of a judgment from the relation of two judgments, is termed Syllogism, from the Greek word *syn*, together, and *logizomai*, I reckon. (See illustrations.)

The term "understanding" is commonly applied to the "thought" processes in question. Thought, or understanding, as psychology teaches, is always fundamental in ideation. In the broadest sense, any process of forming ideas or thoughts, whether the mind thus arrives at "knowledge," or "truth," *i.e.*, ideas and thoughts which are true, or only at "opinion," *i.e.*, ideas and thoughts which may or may not be true, is termed Thinking. If the mind thus arrives at knowledge, the process is termed Knowing. The mind's power of thinking and knowing is termed Intellect.

## II. SENSIBILITY.

The consequences (see Total Reaction, next chapter) of intellectual activity, are states and moods of mental pleasure or pain. These mental states and moods are termed *Feelings*, or *Sensibilities*, or *Emotions*, and the function of mental feeling is termed *Sensibility*, or *Emotion*. The feelings are significantly termed Emotions, from the Latin words *e*, out, and *moveo*, I move, because, whether simple or complex, they tend to reveal themselves in the face, eyes, and carriage of the person affected.

**Simple Emotions.** There is a species of mental pleasure or pain, commonly termed gladness or sadness, in which the emotion is not an attitude, or trend, toward the causes of the pleasure or pain, but simply a state, or condition, to which the person affected has been moved by sensation, ideas, or thoughts. This species of mental feeling is therefore said to be *Subjective* rather than *Objective*, *i.e.*, Simple in its reference to "self" rather than to others. Accordingly, *Feelings that are not attitudes, but only states, are termed Simple Emotions.* Or, *Feel-*

ings that are only states of mental pleasure or pain, and not also attitudes, or dispositions, toward the causes of the mental pleasure or pain, are termed *Simple Emotions*. "Cheerfulness," "good mood," "melancholy," "mental distemper,"—these are the familiar descriptions of simple emotions.

**Affections.** That which gives pleasure, or that which has worth, or that which has come intimately into our life, readily becomes an object of endearment, or sympathy, or respect, or esteem. When something has thus become "dear" to us the feeling is termed *Love*. Friendship, gratitude, patriotism, and piety, are familiar species of Love. The absence, as well as the opposite, of love, is technically termed *Hate*. Ingratitude, heartlessness, and impiety, are familiar species of hate.

In simple emotion there is no object upon which the feeling centres; but in love and hate there is always an object. If the object is "self," the emotional attitude is termed *Egoistic*; if the object is "another," the attitude is termed *Altruistic*. In other words, love and hate are dispositions toward, or relations to, some person or thing, be it self or other, and they are significantly termed *Affections*, from the Latin words *ad*, toward, and *fectio*, disposition. Accordingly, Feelings that are not only states of mental pleasure or pain, but also attitudes of approbation or disapprobation toward the causes of the pleasure or pain, are termed *Affections*. Or, *Feelings that are not only states, but also attitudes of approbation or disapprobation, are termed Affections.*

**Desires.** Pleasure, sympathy, respect, esteem, etc., often become longings, or demands, to possess or enjoy that which gives pleasure, or appears to deserve respect, or esteem. If that which the "heart" demands is at a distance, or difficult to attain, the demand may become intense suffering, as in the case of thirst or personal attachments. When this intense feeling becomes "master" it is termed *Passion*, as in the case of ambition and avarice.

The feelings now under consideration do not only centre upon an object, but they also insist on possessing and enjoying that object. This insistence, egoistic or altruistic, to possess and enjoy that which we long to possess and enjoy, is denoted, for want of a better word, by the term *Attractive*, in the sense of a demand. These feelings of longing, or demand, are therefore not only objective, but also attractive.

To all species of emotional demand, positive and negative, the term *Desire* has been applied. Accordingly, *Feelings that are not only attitudes, but also demands, are termed Desires*. Or, Feelings that are not only attitudes of approbation or disapprobation toward the causes of the mental pleasure or pain, but also requests to possess the causes of pleasure, or to escape the causes of pain, are termed *Desires*. Avarice, ambition, revenge, etc., are familiar species of Desire. Desires whose objects, as food or stimulants, are demanded for physical gratification, are termed *Appetites*; those whose objects, as knowledge or power, are demanded for mental gratification, are termed *Sentiments*. The desire "to know" is termed *Interest*, or *Curiosity*. (Interest is often an affection.)

**Expectations.** Faith in the possibility of attaining that which is desired, is termed *Expectancy*. The union of expectancy and the longing to possess that which is deemed capable of giving pleasure, is termed *Hope*. Deprived of this expectancy, Hope becomes *Despair*. In other words, Desire deprived of expectancy is termed *Despair*. The union of expectancy and the longing to escape that which is deemed capable of giving pain, is termed *Fear*. Fear ceases, or else becomes Hope, when expectancy is removed. Thus it appears that hope and fear have the common element of expectancy. Accordingly, *Desires coupled with faith in their attainment, are termed Expectations*.

The manifestations of sensibility are Simple Emotions,

Affections, Desires, and that modification of Desires termed Expectations.

### III. WILL.

We attempt to determine our "trend," whether it be of mind or body. In this attempt we assume our power to be our own master and sovereign. Within definable limits this assumption is correct, as experience goes to show. In other words, we can "govern" ourselves, as well as think and feel. *The ability to govern ourselves*, however limited the domain may prove to be, *is termed Will, and any exercise of this ability is termed Willing, or Volition.*

**Motives.** Possible courses of activity come to our view as cross-roads do on a journey. There is such a thing as mental pause, and it resembles the traveller's halting at the cross-roads. In this time of mental poise we compare the merits, real or supposed, of the alternatives in view, as, for example, when we try to "make up" our mind on some point of duty. The considerations that influence this mental struggle, as in temptation, may be either intellectual or emotional, as in a case of conscience and passion. There may be either harmony or opposition of intellect and sensibility, as in obedience to law. The influences in this mental poise, whether they be intellectual or emotional, are termed *Motives*, from the Latin word *moveo*, I move. The mental struggle with motives may be very great; but normally it is possible to resist any motive, and to act in opposition to it. This possibility distinguishes motives from causes, and justifies the pause to which we resort. Accordingly, *The influences that enter, but do not irresistibly determine a voluntary struggle, are termed Motives.*

**Decision.** The struggle with motives generally terminates in the voluntary selection of some alternative. This selection is termed a *Decision*, or *Choice*. Accordingly, *The voluntary selection of an alternative after comparing it with others, is termed Decision.* If there be only two alternatives, i.e., if the



choice be limited to the selection and refusal of a course, the selection is termed *Fiat*, and the refusal, *Neget*. In other words, *Fiat* is positive, and *Neget*, negative Decision.

*Intention*. The alternative selected may be something distant in time or attainment, as political preferment. Such a selection is termed *Intention*. Accordingly, *The voluntary selection of an alternative whose attainment is prospective, is termed Intention*. It is in this sense that we intend to be graduates, or to become what we have not yet become. Vigorous intention is termed *Purpose*, and undeviating, invincible purpose, is termed *Resolution*. It is in the latter sense that we resolve to be successful, whatever it may cost, and however exhausting the struggle may prove.

*Attention*. In a limited way it is possible to control our mental activity, *i.e.*, to determine its course, its steadiness, and its continuance on the same track. In other words, we can, under normal conditions, determine our mental trend at any conscious moment of time. This exercise of voluntary power is of several species. (1) It may be a submission, more or less unflagging, to the demands of another will, as in listening or reading. (2) It may be devotion, more or less undeviating, to one interest or task, as in study or play. (3) It may be a transitive decision in thinking, as in the dismissal of one thought in order to admit or continue another, as in passing from one study to another. The phenomena just described are termed *Attention*, from the Latin words *ad*, toward, and *tendo*, I stretch. Accordingly, Continuity of thought in one groove, especially voluntary continuity, is termed *Attention*. Or, the voluntary process of keeping the mind at work on one thing rather than on others, is termed *Attention*. Or, *Thinking of one alternative rather than of others, is termed Attention*.

Motives are present in voluntary activity, but voluntary activity itself assumes the phases of decision, intention, and attention.

**Conclusion.** The purpose of the present chapter has been to observe, classify, and define mental phenomena. We have thus arrived at the conclusion that thinking, feeling, and willing, are the possible mental phenomena, and that there are no other species.

*Mind.* It must be evident enough to any one who observes himself in the concrete, that thinking, feeling, and willing, are not physical phenomena, *i.e.*, phenomena of matter. In other words, it is not our body that thinks, feels, and wills; it is our "self," the mind, or soul, or spirit. Though it be in most intimate junction with the body in which it dwells, the mind is not the "function" of the body, but a distinct entity that itself has functions. This assumption implies several attributes of mind. (1) If mind is not matter, it is spirit. (2) If mind is not matter, it is indivisible, or simple. (3) If mind is not matter, it cannot lose its numerical identity. (4) If mind is not a function, it is an entity. Accordingly, *The simple, spiritual entity which thinks, feels, and wills, is termed Mind.*

*Psychology.* To study mind in order to deal with it, is the indispensable prerequisite in pedagogy. (See the method, beginning of this chapter.) The problems are numerous. The first problem is, to observe the mental phenomena, and to ascertain their laws. This science is termed Psychology, from the Greek words *psyche*, soul, and *logos*, discourse. Accordingly, *The observation of mental phenomena, and the ascertainment of their laws, is termed Psychology.*

## CHAPTER II.

## LAWS OF MENTAL ACTIVITY.

MENTAL activity, as experiments prove, is subject to laws, a knowledge of which is essential to pedagogics.

**Interaction.** (I.) The activities of which the mind is capable, as psychology teaches, are sensation, ideation, relation, emotion, and volition. The various modes of ideation, as shown in the preceding chapter, are perception, consciousness, abstraction, and generalization. Memory is essential to all processes of ideation, and imagination is a mode of ideation in which the mind transforms and transcends its percepts, memories, concepts, etc. The two modes of relation are direct and indirect judgment.

In psychology we isolate these activities as if they were independent individuals; they are, however, really a constant complex of complements, *i.e.*, they always either imply or solicit each other as phases of one entirety. Any disturbance in this interaction, as may be seen in abnormal mental action, interferes with the perfection of the entirety. In short, *interaction is a law of mental activity.*

**Summation of Stimuli.** (II.) The hardest sleeper awakes when the amount of stimulus is sufficiently increased. Whoever knows how to add influences up to a certain amount can win the attention of the most indifferent person. A multiplication of "cues" enables us at last to come upon a forgotten name. A greater number of incentives or a stronger motive finally overcomes emotional or voluntary opposition. Ever cumulating considerations at last conquer the most sullen sinner and win him for God. Indeed, character and conduct seem to be nothing other than rational or emotional sequences

of such summation of stimuli. In other words, *mental activity is subject to summation of stimuli.*

**Neurosis.** (III.) Since *perception* is simply the interpretation of sensations, neurosis, *i.e.*, neural activity, must be the physical basis. Neurosis, as physiological psychology teaches, is the indispensable condition of *consciousness*. The physical basis of *memory*, as already shown, is neurosis. Recent experiments prove that illusion and hallucination can be brought about by drugs and electrical stimulation of the sensory tracts. This means that the nerve-tracks of perception are also the tracks of *imagination*. The fatigue that follows severe mental application, however abstract the thinking may be, is sufficient proof that neurosis accompanies the *higher intellectual processes*. All species of *emotion*, whether simple or complex, are attended by neurosis, as palpitation of the heart, pallor, trembling limbs, etc., clearly show. *Volition* is communicated to executive organisms through neurosis. To be brief, in the present junction of body and mind, *neurosis accompanies psychosis, i.e.*, mental activity.

**Sensation.** (IV.) In many cases of weak sensation, perception is correspondingly uncertain. When, for example, the sensations of sound or light are weak, the perception is commonly faulty and incomplete. The same thing is true of odors, flavors, aches, etc. When, however, the sensation becomes more intense and definite, the full meaning becomes evident. The direct variation in the proportion in question continues up to a point when, as in the case of violent pain, perception is either partial or impossible. We infer from these facts that, *within certain limits sensation and perception are directly proportionate*. This law of interaction harmonizes with the law of summation of stimuli.

**Consciousness.** (V.) We hardly feel the ring that is always on our finger. We are hardly conscious of customary muscular sensations. The consciousness of sensations from

the special senses varies with the varying definiteness of these sensations. The consciousness of sensations of heat or cold, hunger or thirst, increases from extreme vagueness to extreme definiteness. There is, however, a limit to this direct proportion ; when sensations, as physical pain, become extremely intense, consciousness breaks down completely. The inference follows that, *within certain limits sensation and consciousness are directly proportionate*. This law of interaction also harmonizes with the law of summation of stimuli.

**Memory.** (VI.) Memory, as physiological psychology teaches, is psychosis by means of neurosis. In this interaction the body and mind, as experience shows, are mutual elements. In other words, memory is affected by fatigue, illness, age, interest, exercise, and such mental reinforcements as imagination, judgment, etc. The quantity and quality of these various influences that enter into the formation of memory-associations determines the quantity and quality of memory-reproductions. In short, *The character of memory-formations determines the character of the reproductions*. This interaction is therefore also subject to the law of summation of stimuli.

**Imagination.** (VII.) Distress in the vital organs provokes dreams, suggests illusions, etc. Latent disease influences our waking and sleeping world. Physical habits have their counterparts in imagination. Mental experiences, and habits of thought, give direction and impulse to imagination. The imagination of the optimist is a beautiful world, while that of the pessimist is often a desert or a hell. Thus it appears that in these various interactions imagination, like perception and memory, is subject to the law of the summation of stimuli. In short, *The trend of imagination depends upon physical and mental suggestions*.

**Abstraction.** (VIII.) The powers of imagination defy description, and yet this function, too, has its absolute limits. It is impossible to escape the ideas of space and time in the

operations of imagination. So, too, the ideas of number, identity, cause, truth, beauty, and right, are always present, some or all of them, in the operations of imagination. Dreams, for example, abound in fictitious recognitions (identities), units and combinations (number), causes and effects. Illusion is apparent truth, and as such conforms with the conditions of truth. The conceptions of Art arise from the idea of beauty, and even dreams do not wholly deny conscience. In other words, *The utmost limits of abstraction are also the limits of imagination.* This interaction, like those already considered, is therefore subject to the law of the summation of stimuli.

**Identity.** (IX.) Direct judgment, as psychology shows, presupposes the idea of identity, *i.e.*, the distinction denoted by the words agreement and disagreement. The same thing is true of indirect judgment, or reasoning, as any one can prove for himself. This idea underlies all species of generalization and classification, as when we assert that a Rose must either be or not be a plant, but that it cannot both be and not be a plant. The second premise of the inductive syllogism rests entirely on the belief that Nature reveals its genera in its individuals. This idea of "uniformity" is the abstraction of identity. Even in æsthetic and moral judgments, where the concrete is compared directly or indirectly with the abstract, *i.e.*, the real with the ideal, the idea of identity is present in the same indispensable way. In logic the idea in question is analyzed into the axioms of thought. In short, *The abstract distinction of identity is indispensable to direct and indirect judgment.* This intellectual interaction, like others, therefore harmonizes with the law of summation of stimuli.

**Total Interaction.** (X.) Emotion, as psychology teaches, presupposes ideas or thoughts, as when we think of suffering friends and desire to alleviate these sufferings. The ideas of utility, beauty, truth, and duty, seem to be the most potent to awaken feeling. Volition, as psychology also teaches, pre-

supposes emotion, as when love prompts deeds of love. Just as the ideas of utility, beauty, etc., powerfully awaken feeling, so the feelings of utility, beauty, etc., powerfully solicit volition. Thus ideas and thoughts tend to become deeds. In short, *Thinking, feeling, and willing, form a natural series of mental activity.* This interaction of the intellect, sensibility, and will, constitutes the highest summation known to psychology and life.

**Stages of Development.** (XI.) The natural order of development, as inquiry tends to prove, consists of a series of upheavals. In this series perception, memory, imagination, judgment (including abstraction, generalization, and reasoning), and consciousness, seem to be the intellectual stages, while emotion and volition struggle with each other for supremacy along a line of instinctive upheavals and environmental suggestions. The series in question is, however, as biology, etc., teaches, a "broken" line of development. In early life, as Lukens, Ricci, and other scientists teach us, blind instincts and individual impulses tend to substitute themselves for the logical order of adult thinking. Surprising and apparently evil tendencies break the line of the child's progress toward maturity. Intellectual and moral aptitudes apparently safe from relapse suffer "suspended animation." A period of physical and mental "pause," probably for preparation, as Dr. Ellis shows, precedes the mighty adolescent upheaval, which, as Dr. Stanley Hall and others show, is probably the great birthday of maturity. Each new tendency comes into the series of upheavals as a "monopoly," and the "rate of growth" in different aptitudes is quite variable, as those who observe children cannot help seeing. Amid these irregularities of development, however, the series of monopolies, or concentrations, in tendencies and aptitudes is fairly constant, and may be regarded as a law. In short, *The mind matures by stages.*

**Limits of Development.** (XII.) The most surprising variations, as in size and quality of skeleton, muscles, brains, etc., appear in the physical endowments of man. The differences in mental possibilities, as statistics plainly show, are even greater. The genius, for example, surpasses common minds just as much as the total possibilities of the adult exceed those of the infant. The difference between the "childhood of the race" and its present maturity, is probably the most surprising thing in science. In spite of these variations, however, the "specific identity" of the race has remained intact for all epochs of human history. In short, *The maturing mind encounters limits in specific constitution.*



PART II.  
PRINCIPLES OF TEACHING.



## CHAPTER I.

## THE NATURE OF EDUCATION.

THE general features of education are conveniently treated under two heads: (1) The Nature of Man, and (2) The Nature of Education.

## A. THE NATURE OF MAN.

The ends in view in education, as we shall see, make a knowledge of the nature of man absolutely indispensable. Two points deserve our special attention: (1) Man's Capacity for Improvement, and (2) The Species of Man's Capacity for Improvement.

**Capacity.** The statistics of history, biology, etc., prove that man is capable of improvement, or culture, in strength and habit.

*Strength.* (1) Systematic labor, normal in quantity and quality, promotes physical strength, as every one who has thought about the matter knows. The results of athletic sports and physical culture confirm these views. (2) Persistent mental exercise, normal in quantity and quality, strengthens the mental functions, as statistics abundantly prove in the case of sound minds. And much can be done in this respect even for "defectives," as the history of institutions for the deaf, dumb, blind, etc., shows.

*Habits.* The things in which we exercise ourselves physically or mentally become, in a sense, possessions, which are known as Habits, from the Latin word *habeo*, I possess, or have. Thus, for example, walking and reading, become habits. Among the conspicuous features of "habit" are the "ease" and "speed" with which we can by and by do things which at first were difficult and awkward. Habits continually

acquire "momentum," and this feature in connection with its reflex "periodicity," makes the formation of habits at the same time the most hopeful and the most dangerous possibility of education. The intimate interaction of sensation and emotion generally converts habit into "taste," or emotional trend, which by reflex action reinforces habit. The conversion of habit into taste is promoted by the discovery of one's "skill" in things which become habit.

**Species of Capacity.** The improvement, or culture, of which man is capable, as indicated, are (1) Physical Capacity, and (2) Mental Capacity.

*Physical Capacity.* Within the limits of specific constitution, as statistics show, the human body is capable of amazing increase in strength, executive ease and speed, and artistic skill. The achievements of athletes, manufacturers, and artists, are familiar illustrations.

*Mental Capacity.* Within the limits of specific constitution, as history shows, our mental possibilities are sublime. (1) Through intellectual apprehension of truth, utility, beauty, duty, and Deity, man becomes a scientist, inventor, artist, moralist, and religionist. (2) Emotion solicits volition (see tenth law of mental activity), and thus converts theory into practice. (3) The possibilities of volition, as consciousness and history seem to affirm, are coördinate with our intellectual possibilities. In the midst of the realizations of modern history, the mind turns instinctively toward the attainment of ideals as yet only imperfectly realized.

## B. THE NATURE OF EDUCATION.

The general character of the attainment of our possibilities is conveniently treated under the following heads: (1) Self-activity, (2) System, (3) Emancipation, (4) The Pupil's Limits, (5) The Ideal in Education, and (6) The Definition of Education.

**Self-Activity.** Conscious effort in the evolution of possibilities is termed Self-activity. Self-activity therefore presupposes consciousness, ideals, *i.e.*, abstract conceptions of possibilities, and will. Man, as psychology teaches, is such a self-active agent. Man's capacity for self-activity, as we must infer from the eleventh law of mental activity, is at the same time both the guarantee and the general necessity in the evolution of his possibilities, *i.e.*, in his "education." According to the eleventh law of mental activity, "play," *i.e.*, instinctive activity, and "work," *i.e.*, voluntary activity, are the successive phases of self-activity.

*Play.* Froebel observed that play is the activity of functions instinctively clamoring for exercise, and that we cannot give a satisfactory account of such activity unless it be Nature's provision for the earlier development of the functions of body and soul. The Kindergarten is simply systematic play from which caprice is gradually eliminated. Inasmuch as play is the manifestation of aptitudes, it becomes the educational key to the child's talent and destiny.

*Work.* Absolute abandonment to spontaneous and self-satisfying activity, *i.e.*, play, would in time develop into monstrous caprice and arbitrariness. In that event the aging individual would not mature into the powers, habits, tastes, and wisdom needed for highest happiness, character, and life. Therefore the child must gradually overcome his caprices and develop the power of useful and moral self-subordination. In this obedience to imperatives of utility, necessity, or duty, the pupil is no longer a creature of impulse, but a conscious and intentional agent in his own destiny. In short, *I. Self-activity is the basis of education.*

**Supervision.** The immaturity of the child (see the eleventh law of mental activity) makes authoritative supervision over the pupil's activity an absolute educational necessity. This necessary system of authoritative supervision over pupils

is termed "Teaching." The teacher's work consists of three things (1) Adaptation of Tasks, (2) Stimulation, and (3) Direction.

*Adaptation of Tasks.* (1) In consequence of the pupil's relative weakness (see the eleventh law of mental activity), the pupil's tasks must be adapted to stages of development. The stages of physical, instinctive, acquisitive, and productive "monopoly," must be respected in the pupil. (2) The pupil's tasks must also be adapted to some extent to special tastes and talents, since these are generally correlatives, and in the main constitute the pupil's individuality, God's creative impress, and man's inalienable guarantee of success in something or other.

*Stimulation.* In consequence of tardiness and inhibitions in the appearance of aptitudes, the pupil needs a stimulus to self-activity. The "concrete," as statistics show, is the most effective stimulus in earlier, and the "abstract" in later years. Ignorance in these matters incapacitates the teacher.

*Direction.* In addition to stimulus, the pupil needs a teacher's direction. (1) The ordinary pupil wastes his energies and loses his way. In conflict with difficulties, the pupil needs suggestions, hints, illustrations, questions, etc. (2) In the crises along the broken line of his development (see the eleventh law of mental activity), the pupil needs special supervision, and sympathetic support. The greatest perils and at the same time the greatest opportunities belong to the Kindergarten epoch, to the period of pause before adolescence, and to the adolescent upheaval. (3) Among the most important things to the pupil's welfare is effective interaction of body and mind. (See the second and third laws of mental activity.) It therefore devolves on the teacher to combine the best physical conditions with the pupil's mental tasks. Accordingly, II. *Authoritative supervision is the necessary supplement of the pupil's self-activity.*

**Emancipation.** The trend of the child's natural development (see the eleventh law of mental activity) and practical necessity, suggest and require gradual release from the teacher's authority. It is along this line that teachers are likely to make the most irreparable mistakes.

(1) For a time the old bird feeds and tends and guards her young with utmost attentiveness. By and by, however, the little proteges, being "full-fledged," are made to shift for themselves, and their tutelage ends.

(2) So, too, there comes a time when boys and girls attain to their "majority," and are said to be "of age." Until then they remain the proteges of others, their tutelage being preparatory. Thenceforward they are to shift for themselves, and, taking their place among equals, to work out a worthy destiny in their own way. They may, and will, if they be wise, still value and even seek the *counsel* of others, but need not abide by it from necessity. They may, if they see fit, submit to *authority* from without, but cannot strictly, as hitherto, be required to do so.

(3) The transition here described is the one *toward* which true education must tend, and *for* which it must prepare. Otherwise it fails to connect "School" with "Life," and, to that serious extent, fails in its function. It is, however, only when boys and girls can really be expected to help themselves and to govern themselves that they should attain to freedom from necessary subjection to others. Assuming that they can help themselves and govern themselves, the world thenceforward holds them accountable. They should not be liberated too soon, lest they go astray, nor too suddenly, lest they be unable to preserve their balance, nor too late, lest it be impossible for them ever to stand alone. Their happiness, virtue, and success, are at stake. Accordingly, III. *Gradual release from authoritative supervision must prepare the pupil for self-supervision.*

**Limitations.** (1) The oak exists in smaller proportions in the acorn, and is nothing other than that for which provision had been made in the acorn. So, too, it is impossible to develop powers, habits, tastes, or wisdom, for which the Creator has not made provision in the original constitution of a man (eleventh law). (2) Many cannot attain to those powers, habits, tastes, and wisdom, for which provision was made in their original constitution, for several reasons, (*a*) their health does not allow it; (*b*) their leisure is limited by poverty, business, or some one's adverse control; and (*c*) their environment for too long a period of years does not inspire and prompt to those efforts which, as suggested by the eleventh law of mental activity, are essential to the pupil's progress. (3) Others cannot attain to the best results in education, because they become the proteges of supervisors and governors who do not understand their function, or, understanding it, fail to mind their business. Accordingly, IV. *The pupil's limitations should be removed as much as possible.*

**The Ideal in Education.** (1) The perfection of our Creator's character; the immortality of essential humanity; and human capacity for happiness, are assumptions justified by reason and experience. The capacity for happiness, moreover, is a persistent endowment of the human race. Thinking of this endowment in connection with the perfect character of our Maker, we cannot avoid the conclusion that man is meant for ultimate happiness. This destiny of happiness, however, is conditional, *i.e.*, there must be adequate preparation for it in Time. Accordingly, ultimate *happiness* is to be an ideal (purpose) of humanity. (Eleventh and twelfth laws of mental activity.)

(2) The universal distinction of right and wrong, in connection with ability to will the right and wrong; the promotion of virtue and duty by Christianity; the responsibility of human beings to their Maker and to each other; and the requirement of virtue for real happiness, are assumptions justi-



fied by reason and experience. These assumptions lead to the unavoidable conclusion that man is meant for a moral destiny. Accordingly, *virtue* is to be an ideal of humanity. (Eleventh and twelfth laws of mental activity.)

(3) Reason and experience justify the following additional assumptions: (a) The present powers of man are such as to fit him for "complete living" in Time, *i.e.*, man is so constituted a junction of body and spirit as to make "human affairs" a possibility, a pleasure, a duty, or even a necessity; (b) the realization of this temporal destiny is conditional, *i.e.*, it depends on adequate accommodation to the environment of this life as well as on efficient use of this environment. Thinking of human constitution and its fitness in temporal environment, we come to the unavoidable conclusion that man is meant also for a destiny in which the great problems are those of livelihood, home, education, government, and so forth, *i.e.*, a temporal destiny. Accordingly, "complete living" in Time is to be an ideal of humanity. (Eleventh and twelfth laws of mental activity.)

Thus it follows that there are three great ends (goals) of life, three ideals (purposes) of humanity. But education is essentially progression toward these ideals (hopes) of humanity. Accordingly, V. *The ultimate objects of education are happiness, virtue, and "complete equipment" for life.*

**Definition of Education.** From the foregoing considerations, based almost wholly on the laws of mental activity, and especially on the eleventh and twelfth laws, we can construct an inductive definition of education. Thus, VI. *The realization of man's possibilities, through systematized self-activity, for complete living, is termed Education.* The term is derived from the Latin words *e*, out, and *duco*, I lead, and thus refers us to the fundamental fact in education, namely, that exercise, or self-activity, promotes development. It serves our pedagogic purposes to consider the species of education.

*Species of Education.* The number of man's powers and the ends to be kept in view in the cultivation of these powers, determine the possible species of education.

(1) Physical education has to do with the body, and aims to make it a fit abode and instrument of the spirit. As a means to these ends a training in physiology and physical culture are indispensable.

(2) Intellectual education has to do with the thinking and knowing powers of the mind, and aims to develop these powers into fit instruments of life. As a means to this end, both general and special courses of study are necessary.

(3) Moral education has to do with character-building. As a means to this end the pupil's will must be subordinated to the ideas of utility, beauty, duty, and religion. The corresponding subordinate species of moral education are termed practical, æsthetic, social, and religious. The most effective stimulus in moral education is religion, which consists of faith in God, love to God and man, and obedience to God. All species of moral education begin in the intellect, and the corresponding emotions thus waked up solicit the will. As means to the ends of moral education the pupil needs a training in the useful arts and sciences, in the fine arts, and in personal, social, and religious virtues.

## CHAPTER II.

## PRINCIPLES OF CULTURE.

It is possible, as experiments prove, to *promote* the development of which the pupil is capable. In other words, activities can be quickened, strength increased, habits and tastes improved, and knowledge matured. In this work the teacher must conform with certain laws, to which, as history, anthropology, and biology teach us, the pupil's natural development is subject. The general truths in question are termed Principles of Culture.

**Exercise.** I. Exercise increases the activity of the pianist's fingers and the strength of the blacksmith's arm. Habits are formed by exercise in that which is to become habit. Habits generally become tastes. Thus, within the limits of design, as expressed in our constitution, exercise tends to promote development. The remarkable thing about this law of exercise is its generality, *i.e.*, its exceptions are very few when the exercise is normal in quality, quantity, and time. Nevertheless, this law of exercise, as biology teaches, has limitations. Swallows kept caged until after their usual time for learning to fly, and then released, fly readily. The feats are the developed results of forces which "ripen internally at approximately definite times." Genius, like the powers of the swallow's wings, tends to ripen somewhat independent of exercise. The indications are that many aptitudes of body and mind, including instincts and appetites, ripen at approximately definite times as the result of special endowment and hereditary momentum. But these facts do not invalidate the law in question, since exercise generally, perhaps always, promotes apti-

tudes and tendencies which appear in this way. In short, *exercise promotes development.*

**Correlation.** II. The interactions required by the law of summation, as stated in the laws of mental activity, are evidently the primary requirement of mental exercise. In short, *the natural correlation of mental activities is the condition of successful development.* This general requirement resolves itself into the following special requirements.

*Perception.* Definiteness of sensation, according to the fourth law of mental activity, is the primary requirement in the development of perception. Obedience to this requirement will stimulate interest and therefore quicken activity. The ideal ends in view, *i.e.*, activity, reliability, and interest, are thus attained.

*Consciousness.* Voluntary self-observation, according to the fifth law of mental activity, is the primary requirement in the development of consciousness. Obedience to this requirement will enable the pupil in due time to make "self" an "object of thought," just as the external world is his object of perception. The ideal ends in view, *i.e.*, the power and habit of introspection, are thus developed.

*Memory.* Effective interaction of body and mind, according to the sixth law of mental activity, is the primary requirement in the cultivation of memory. In other words, the desired quantity and quality of memory-reproductions can be secured only by such reinforcements in memory-associations as physical vigor, interest and attention, frequent repetition, logical suggestions, imagination, etc. Obedience to these requirements will result in definite, persistent, and suggestive association tracks. The ideal ends in view, *i.e.*, economic memory-associations and reliable memory-reproductions, will be thus attained.

*Imagination.* Physical and mental suggestion, according to the seventh and eighth laws of mental activity, is the special

requirement in the cultivation of the imagination. In other words, sensation, perception, and memory, must be made efficient furnishing agents in the structures of imagination, while exercise in the ideas of space, time, beauty, duty, and truth, will serve as mighty stimuli. The understanding, too, should be called into the service of imagination. Obedience to these requirements will strengthen and purify imagination. The ideal ends in view, *i.e.*, service to art, literature, science, invention, etc., will thus be attained.

*Thought.* Generalization, according to the first law of mental activity, begins in abstraction, but presupposes the other modes of ideation, and implies the two modes of thought. Without "thought," as psychology teaches, generalization would be impossible. Ideation and relation, therefore, are the complementary requirements in the development of these processes. In other words, the cultivation of perception, consciousness, memory, imagination, judgment, and reasoning, promote the development of abstraction and generalization. The ideas of space, time, cause, identity, utility, beauty, duty, and truth deserve special attention. Obedience to these requirements will not only stimulate and strengthen the mind in these higher processes, but also make it its own critic. The ideal ends in view, *i.e.*, activity, ability, and self-reliance, will thus be within the pupil's reach.

*Sensibility.* In the cultivation of the "heart," it is desirable, according to the fifth general principle of education, to develop right feelings into motives of conduct, and to subdue such feelings as interfere with man's happiness, usefulness, and morality. These ends can be attained, according to the tenth law of mental activity, by exercising the feelings in junction with the intellect and will. In other words, the pupil's feelings must be subordinated to the ideas of utility, beauty, duty, and truth. The pupil must be made to see the importance of such discipline. Like Fenelon and Pestalozzi,

the teacher must invent and utilize all sorts of situations in the pupil's discipline. Even the physical conditions and environments of the pupil must be utilized in the cultivation of his feelings.

*Will.* Subordination to the highest interests of humanity, is the right ideal in the cultivation of the will. This end must be attained, according to the tenth law of mental activity, by exercising the will in junction with the intellect and the feelings. In other words, the ideas of utility, beauty, duty, and truth, must be developed into ideals, the corresponding feelings must become motives to right conduct, and the habit of pausing long enough to decide intelligently between doubtful alternatives must take the place of impulse and caprice. When evil ideas and tendencies are present, the will needs the momentum of right habit and the stimulus of good example. The development of right intentions is probably the most effective stimulus to the important habit of attention. The physical conditions and environments of the pupil must also be utilized in the cultivation of the will.

*Concentration.* III. According to the fifth general principle of education, the best possibilities are the ends in view in culture. These ends, according to the tenth law of mental activity, can be attained in part at least by exercising all functions in their natural junction. But, according to the eleventh law of mental activity, these possibilities cannot all be realized at once. In other words, *the series of ripening tendencies and aptitudes suggest a series of concentrations in exercise.* It is, accordingly, of utmost importance, to make every pupil a "special" study, since the tendencies and aptitudes in question do not ripen exactly in the same order and the same way in all pupils.

*Limits.* IV. According to the twelfth law of mental activity, *the limits of the pupil's development are not only racial but individual.* The ideal teacher must therefore make each

pupil his special study. This requirement makes "child study" the most important movement in the history of education. Apart from such study, the "school" will crush ordinary individualities under a load of impossible tasks, and imprison genius in "grades" made by hand. In short, the pupil's tasks must be adapted to his individuality.

## CHAPTER III.

## THE NATURE OF KNOWLEDGE.

IDEAS and thoughts that are true, are termed Knowledge. Thoughts that are true of some individuals of a genus, or of instances, are termed Particular Truths, or Facts, as, *Many people love music*. Thoughts that are true of *all* the individuals of a genus, or of all instances, are termed General Truths, or Principles, as, *All horses are vertebrates*. Truths whose exceptions are few or unimportant, though not absolutely universal, are also termed general truths. Ideas and thoughts (facts and principles) at which the mind arrives without system in process or product, constitute Common Knowledge. Facts and principles at which the mind arrives by observation, induction, and deduction, and which it organizes into a system, constitute Scientific Knowledge, or Science. The sciences that begin with perceptions, are termed Empirical Sciences, as Botany and Chemistry. The sciences that start with consciousness, are termed Rational Sciences, as Psychology.

## A. SPECIES OF KNOWLEDGE.

The two species of "Being" known to man are *Matter* and *Mind*. Matter occupies *space* and exists in *time*. Repetition in matter and time, gives rise to *number*. The science of space and number, or, the science of quantity, is termed *Mathematics*. The presence of various physical and vital forces in matter, gives rise to *Physical* and *Biological* Sciences. The physical and biological sciences are together termed *Natural* Sciences. The presence of *mind* in living, organized beings gives rise to the Psychological, or *Mental* Sciences. The preceding catalogue exhausts all possibilities of logical division. Thus it appears that all sciences can be classified



into three or four comprehensive species: (1) Mathematical Sciences; (2) Natural Sciences; and (3) Mental Sciences. The synthesis of sciences into a system of ultimate generalizations is termed *Philosophy*.

**Mathematics.** There are several special departments in mathematics. (1) The science of form and extension is termed *Geometry*. Trigonometry is the practical application of geometry. (2) The science of numbers is termed *Arithmetic*. (3) The *general* science of quantity is termed *Algebra*. Calculus is a highly developed form of algebra.

**Natural Sciences.** There are many special problems, and therefore many special departments, in the study of physical Nature.

**Physical Sciences.** The presence of various physical forces gives rise to the Physical Sciences. (1) The science of molecular forces is termed *Physics*, or Natural Philosophy. Physics presupposes mathematics. (2) The science of atomic forces is termed *Chemistry*. Chemistry presupposes mathematics and physics. (3) The science of the properties and formation of minerals is termed *Mineralogy*. Mineralogy presupposes mathematics, physics, and chemistry. (4) The science of the formation of the earth is termed *Geology*. Geology presupposes mathematics, physics, chemistry, and mineralogy. (5) The science of the heavenly bodies is termed *Astronomy*. Astronomy presupposes mathematics, physics, chemistry, etc.

**Biological Sciences.** The presence of various life-forces in organized beings gives rise to the Biological sciences. (1) The science of plant-life is termed *Botany*. Botany presupposes mathematics and physical sciences. (2) The science of animal-life is termed *Zoölogy*. Zoölogy presupposes mathematics, the physical sciences, and botany. (3) The science of the physical life of man is termed *Physiology*. Its departments are very many. Physiology presupposes mathematics, the physical sciences, botany, and zoölogy.

*Geography.* The science of the earth *as man's habitat* is termed *Geography*. Geography is to a very great extent an eclectic science, its subjects of study being found within the domain of the natural sciences and history.

**Mental Sciences.** The presence of mind in living, organized beings gives rise to the Mental Sciences.

*Intellect.* The intellect is the subject of several sciences. (1) The science of the phenomena of consciousness is termed *Psychology*. Psychology presupposes mathematics, physics, chemistry, physiology, etc. Thus arise psychophysics, pathology, physiological psychology, etc. (2) The science of formal reasoning is termed *Logic*. Logic presupposes psychology, etc.

*Feeling.* As "truth" is the end of intellect, so is "propriety" the heart's chief object. This relation gives rise to *Æsthetics*, the science of the Beautiful. (1) The science of delineation is termed *Drawing*. (2) The science of constructing buildings is termed *Architecture*. (3) The science of representing ideals in stone, etc., is termed *Sculpture*. (4) The science of representation by means of form and color is termed *Painting*. (5) The science of melody and harmony is termed *Music*. These sciences generally follow, while common knowledge precedes, the corresponding Arts.

*Will.* The will is the determinative element in several sciences. (1) The science of events is termed *History*. The two departments of history are *Chronology* and the *Philosophy* of History. (2) The science of morality is termed *Ethics*, or Moral Philosophy.

*Language.* Language is the product of the whole mind rather than of intellect, feeling, or will. The mind expresses its ideas, thoughts, feelings, and volitions by means of *words*, *sentences*, and *discourse*. (1) The history of words is termed *Etymology*. Philology in a species of Etymology. (2) The science of the physical structure of words is termed *Orthography*. Orthography presupposes etymology, etc. (3) The

science of the sentence is termed *Grammar*. Grammar presupposes etymology, orthography, etc. (4) The science of discourse is termed *Rhetoric*. Rhetoric presupposes grammar, logic, etc. (5) The interpretation of discourse is termed *Reading*. (6) The construction of discourse is termed *Composition*. (7) The science of the structure of alphabetic letters is termed *Penmanship*.

*Theology*. The science of God is termed *Theology*. Theology is properly classified as a mental science, and presupposes all other sciences. The study of God's works in order to know God is termed *Natural Theology*. The study of God's Word in order to know God is termed *Revealed Theology*. Religion is theology in the concrete.

*Arts*. The physical construction of knowledge is termed *Art*. Thus we speak of the arts of penmanship, drawing, music, painting, architecture, printing, agriculture, etc. Those arts whose chief end is Beauty are termed *Fine Arts*, as music and sculpture. Those arts whose chief end is Utility, are termed Useful Arts, as agriculture and manufacturing.

## B. THE PSYCHOLOGY OF SCIENCE.

There are three steps in the process of science: (1) Ideation; (2) Direct Relation of Ideas; and (3) Syllogism.

*Ideation*. In the present junction of body and mind sensation and consciousness are the presuppositions of knowledge. The process of referring sensations to physical impacts as causes is termed Perception. Selective attention to agreements between compared experiences of consciousness follows and is termed Abstraction. Memory is always indispensable. Cumulative conception follows abstraction and is termed Apperception, or Generalization. Apperception is the mind's appropriation and conception of the agreements and common qualities in the mass of its experiences of individuals. The resulting concept represents the mind's conquest of a subject

up to that moment. If the experiences in question are perceptions apperception is external; if they are experiences of consciousness apperception is internal. Apperception is more commonly termed Generalization, though the terms do not denote absolutely the same thing. Classification, the grouping of individuals on the ground of agreements, follows generalization. Complete generalization is the ultimate stage of ideation. The perfection of the process depends upon the perfection of the mind's experiences. Perfect observation is, therefore, the first requisite in the development of a science. The necessary supplements are memory and imagination.

**The Direct Relation of Ideas.** Comparison of ideas follows ideation and is termed Judgment, as, *James is a pupil*. In this example the ideas compared were *James* and *pupil*, and the relation discovered was that of Identity. The opposite, or negative relation, is termed Difference. The process generally amounts to the synthesis or classification of individuals, or the analysis of a genus. Sometimes, however, the subject and the predicate of a judgment have the same extent, as, *London is the capital of England*. The perfection of judgment, or the direct relation of ideas, depends upon the perfection of the ideas compared and the power of comparison. Perfect judgment is the second requisite in the development of a science.

**Syllogism.** Syllogism, the derivation of a judgment from the relation of two judgments, follows simple judgment, and is the final process of science. (1) In this final process science becomes a system of introductory and ultimate syllogisms. The introductory syllogism of science is *inductive*; the ultimate syllogism is *deductive*. The former process is a transition from individuals to the genus; the second is a passage from the genus to its individuals. Sometimes, however, the argument amounts only to Translation, the quantity of the conclusion being the same as that of the original judgment. (2) The Syllogistic process of science presupposes certain fun-

damental though inductive judgments termed "Laws of Thought," because all persons without exception are subject to them in their intellectual operations. (3) The perfection of syllogism depends, of course, upon the perfection of the premises, the perfect cognition of their relation, and perfect obedience to the laws of thought. Logical perfection is, therefore, the third requisite in the development of a science. (For a complete description of the syllogism and scientific method, the student is referred to some text-book on Logic.)

*Specific Syllogistic Features of the Sciences.* The second premise of inductions in Mathematics is much stronger than that of the natural and mental sciences.

(1) The second premise in mathematics, with a few exceptions in arithmetic, passes from several experienced individuals to the genus, and leads to a universal conclusion that reaches beyond all possible experience, and yet the conclusion is evidently valid because the individuals involved are absolutely similar by hypothesis. When, for example, it has been found that the sum of the angles of *one* triangle is two right angles, the conclusion that the sum of the angles of *any* triangle is two right angles follows irresistibly because the second premise contains the truth that the one triangle is a sample of all triangles.

(2) The experienced individuals from which the second premise of natural science inductions passes to the genus, are not always "representative individuals." It follows that the universal conclusions at which natural sciences thus arrive may sometimes be fallacious. The history of the natural sciences is in great part a record of such conclusions. Great experience is, therefore, a requisite in the construction of a natural science.

(3) In the inductions of the mental sciences the gratuitous factor is even more troublesome than in the natural sciences, the totals being ideals rather than realities, qualities rather than quantities.

(4) In the inductions of Philosophy, this term being used

in the sense of ultimate generalizations, the gratuitous factor of the second premise is the dominant factor. Encyclopedic knowledge and logical competency are, therefore, the great necessities in the construction of philosophy.

*Note.* The lines of thought just tracked in the description of the sciences are the lines of thought which the nature of the mind requires in their order, and they exhaust the possibilities of the mind. The stupendous inference follows, that scientific conclusions are often rather probable than demonstrative, *i.e.*, an appeal to faith rather than sight.

### C. COURSES OF STUDIES.

The correlation of the sciences (see Species of Knowledge) and the mental stages in the development of a science (see the Psychology of the Sciences), together with the demands of life, must obviously determine the courses of studies in our schools.

**Correlation.** In the section on "Species of Knowledge" the attention of the reader was called to the interdependence of the sciences. In other words, it is impossible to develop any science without calling into service many others. Indeed, all the sciences are related to each other somewhat like the members of the human body, so that all parts serve all other parts and contribute to the perfection of the whole. This interesting and important communion of the species of knowledge is termed *Correlation*. Courses of study should, of course, be so planned as to recognize this correlation of branches.

**Concentration.** Some branches can be studied to advantage at earlier periods in the pupil's career, and others at later times, and these branches, as educators believe, are also the best means of culture at the time. Branches in which imitation and association are the most important factors, as

spelling, pronunciation, writing, etc., should therefore receive special attention in the lower grades, and those branches in which the discovery of relations is the indispensable factor, as grammar, history, arithmetic, etc., should receive special attention in higher grades. The purpose of such "concentration" on some branch or group of branches is obvious; it is designed to be to the advantage of the study while it catches each mental function at its high tide of possibility. (Eleventh law of mental activity.)

**Utility.** Although "correlation" and "concentration" of studies should always be the dominant ideas in the construction of courses of study, the needs of life require that programmes be somewhat adjusted to meet the demands of our times. If one end in view in education is equipment for life, the necessary means to this end must be introduced into our schools.

**Catalogue of Studies.** The catalogue of studies on page 55 is designed to exhibit the "correlation," "concentration," and practical adaptability of studies for pupils of three grades, the grades arising from the degrees of complexity in the studies proposed for the respective grades.

*Elementary Course.* The "Report of the Committee of Fifteen," being in substantial agreement with our catalogue, distributes the branches of the *Elementary Course* over eight years. (See pages 56 and 57.)

*Elementary and Secondary Courses.* It is believed, however, that the "Committee" fails to do justice to Numbers, Spelling Books, Mental Arithmetic, Geometry, and Manual Training. The "Report of the Committee on Secondary Education in Pennsylvania" contains a programme of the Elementary and the Secondary Courses, both very much in harmony with the present chapter. It will serve to point out the relation of these grades, and is therefore inserted opposite page 58.

**Programmes.** Dr. E. E. White suggests the excellent programme given on page 58 for schools of three grades. It satisfies the requirements of the present chapter, and deserves thorough mastery.



ELEMENTARY COURSE (6-14).		SECONDARY COURSE (14-22).		UNIVERSITY.
Primary Grades.	Grammar Grades.	High School.	College.	
Reading. Spelling. Writing. Language Lessons. Grammar. Dictionary. Arithmetic— 1. Written. 2. Mental. Beginners' Algebra. Forms. Beginners' Geometry. Object Lessons. Natural History. Physiology. Geography— 1. Political. 2. Physical. Singing. Drawing. Physical Culture. Manual Training. Biography. Travels. History.		Grammar. Rhetoric. Composition. Literature. English Classics. Latin. Foreign Languages. Philology. Psychology. Logic. Natural Theology. Higher Arithmetic. Bookkeeping. Algebra. Calculus. Geometry— Plane, Solid, Spherical. Trigonometry. Analytical Geometry. Geography. Physics. Chemistry. Biology. Geology. Astronomy. Meteorology. Fine Arts. Æsthetics. Physical Culture. Manual Training. Mythology. History— U. S., General, Universal. Civics. Economics.		General Grammar. Languages. Philology. Psychology. Logic. Theology. Philosophy. Etc.  Special Mathematics. Philosophy of Mathematics. Etc.  Natural Sciences.   Art.   Philosophy of History. Etc.

EXPLANATION.—For time distribution, see next page.

BRANCHES.	1st year.	2d year.	3d year.	4th year.	5th year.	6th year.	7th year.	8th year.
Reading . . . . .	Ten lessons a week.		Five lessons a week.					
Writing . . . . .	Ten lessons a week.		Five lessons a week.		Three lessons a week.		. . . . .	
Spelling lists . . . . .	. . . . .		. . . . .		Four lessons a week.		. . . . .	
English Grammar . . . . .	Oral, with composition lessons.		{		Five lessons a week, with		{	
Latin . . . . .	. . . . .		. . . . .		. . . . .		. . . . .	
Arithmetic . . . . .	{		Oral, sixty minutes		Five lessons a week, with text-book.		{	
Algebra . . . . .	. . . . .		. . . . .		. . . . .		. . . . .	
Geography . . . . .	Oral, sixty minutes a week.		{		* Five lessons a week, with text-book.		{	
Natural Science + Hygiene . . .							Sixty minutes a week.	

\* Begins in second half year.

United States History . . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	Five lessons a week. . . . .	. . . . .
United States Constitution . . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	{	* Five lessons.
General History . . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
Physical Culture . . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
Vocal Music . . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
Drawing . . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
Manual Training, or Sewing + Cookery . . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	One-half day each week.	. . . . .
No. of Lessons . . . . .	{	20 + 7, daily exercise.	20 + 7, daily exercise.	20 + 5, daily exercise.	24 + 5, daily exercise.	27 + 5, daily exercise.	27 + 5, daily exercise.	27 + 5, daily exercise.	23 + 6, daily exercise.	23 + 6, daily exercise.	{
Total Hours of Recitations . . . . .	12	12	11 $\frac{2}{3}$	13	16 $\frac{1}{4}$	16 $\frac{1}{4}$	16 $\frac{1}{4}$	16 $\frac{1}{4}$	17 $\frac{1}{2}$	17 $\frac{1}{2}$	. . . . .
Length of Recitations . . . . .	15 min.	15 min.	20 min.	20 min.	25 min.	25 min.	25 min.	25 min.	30 min.	30 min.	. . . . .

\* Begins in second half year.

## THREE-GRADE PROGRAMME.

Closing Time	Minutes.	Primary (C).	Secondary (B).	Advanced (A).
9.10	10	Opening Exercises.		
9.35	25	Seat Work.*	Arithmetic.	<i>Arithmetic.</i>
10.00	25	Number (on slate or with objects).	<i>Arithmetic.</i>	Geography.
10.25	25	<i>Number.</i>	Geography.	Geography.
10.45	20	Form Work (paper folding, stick laying, etc.).	Geography.	<i>Geography.</i>
10.55	10	Recess.		
11.15	20	Silent Reading.	<i>Geography.</i>	Grammar.
11.35	20	<i>Reading and Spelling.</i>	Form Work (map drawing, sand moulding, etc.).	Grammar.
12.00	25	Excused from school.	Reading.	<i>Grammar.</i>
		Noon Intermission.		
1.10	10	*	*	*
1.30	20	Form Work (clay modelling, paper cutting, etc.).	<i>Reading.</i>	Reading.
1.50	20	Silent Reading.	Seat Work.*	<i>Reading.</i>
2.10	20	<i>Reading and Spelling.</i>	Animal or Plant Study.	U. S. History or Physiology.
2.40	30	<i>Writing<sup>2</sup> or Language.<sup>3</sup></i>	<i>Writing<sup>2</sup> or Language.</i>	<i>Writing<sup>2</sup> or Language.<sup>3</sup></i>
2.50	10	Recess.		
3.10	20	Number (on slate or with objects).	Spelling.	<i>U. S. History or Physiology.</i>
3.35	25	<i>Drawing,<sup>2</sup> Singing,<sup>2</sup> or Moral Instruction.<sup>1</sup></i>	<i>Drawing,<sup>2</sup> Singing,<sup>2</sup> or Moral Instruction.<sup>1</sup></i>	<i>Drawing,<sup>2</sup> Singing,<sup>2</sup> or Moral Instruction.<sup>1</sup></i>
3.50	15	Excused from school.	<i>Spelling.</i>	Spelling.
4.00	10		Arithmetic.	<i>Spelling.</i>

\* As may be provided for by the teacher.

NOTES.—The small figures at right indicate the number of lessons a week. United States History may be taught the first half of the session, and Physiology the second half; or each branch may have two lessons a week. On Friday the last 25 minutes may be devoted to instruction in hygiene, temperance, physics, natural history, etc.

SECONDARY SCHOOL.—HIGH SCHOOL OR ACADEMY.

	year. 13-14.	9th year. Age, 14-15.	10th year. Age, 15-16.	11th year. Age, 16-17.	12th year. Age, 17-18.
1. LATIN	now the	5 p. a wk.	5 p. a wk.	5 p. a wk.	5 p. a wk.
2. GREEK	before Greek.		5 p. a wk.	4 p. a wk.	4 p. a wk.
3. ENGLISH	ar, 3 p. a	Literature, 3 p. a wk. Composition, 2 p. a wk.	Literature, 3 p. a wk. Composition, 2 p. a wk.	Literature, 3 p. a wk. Composition, 1 p. a wk. Rhetoric, 1 p. a wk.	Literature, 3 p. a wk. Composition, 1 p. a wk. Grammar, 1 p. a wk.
4. MODERN LANGUAGES	French or German or Italian, 3 p. a wk. at least.	The language begun below, 4 p. a wk.	The same language, 4 p. a wk. Second language, 4 p. a wk.	The same language, 4 p. a wk. Second language, 4 p. a wk.	The same language, 4 p. a wk. Second language, 4 p. a wk.
5. MATHEMATICS	Elementary Geometry, 1 p. a wk.	Algebra, 5 p. a wk.	Algebra or Book-keeping and Commercial Arithmetic, 2½ p. a wk. Geometry, 2½ p. a wk.	Algebra or Book-keeping and Commercial Arithmetic, 2½ p. a wk. Geometry, 2½ p. a wk.	Trigonometry and higher Algebra for candidates for scientific schools.
6. PHYSICS	measure-	Elective Astronomy, 5 p. a wk. 12 wks.		Chemistry, 5 p. a wk.	Physics, 5 p. a wk.
7. NATURAL HISTORY	plants; the	One yr. (which yr. not specified) 5 p. a wk. for botany and zoölogy. Half-yr. (late in course), anatomy, physiology, and hygiene, 5 p. a wk.			
8. HISTORY	and Roman History, 1 wk.	French History, 3 p. a wk.	English History, 3 p. a wk.	American History, 3 p. a wk.	A special period intensively, and Civil Government, 3 p. a wk.
9. GEOGRAPHY	Geography, geology, or meteorology at some part of high school course; possibly more than one of these election is allowed.)			Elective Meteorology, ½ this year or next.	Elective Geology or Physiography, ½ year.

k; yr. = year.



SUBJECTS.	ELEMENTARY GRADES.—PRIMARY AND GRAMMAR SCHOOL.								SECONDARY SCHOOL.—HIGH SCHOOL OR ACADEMY.			
	1st year. Age, 6-7.	2d year. Age, 7-8.	3d year. Age, 8-9.	4th year. Age, 9-10.	5th year. Age, 10-11.	6th year. Age, 11-12.	7th year. Age, 12-13.	8th year. Age, 13-14.	9th year. Age, 14-15.	10th year. Age, 15-16.	11th year. Age, 16-17.	12th year. Age, 17-18.
1. LATIN . . . . .					Reasons given for beginning Latin earlier than is now the custom.				5 p. a wk.	5 p. a wk.	5 p. a wk.	5 p. a wk.
2. GREEK . . . . .							Latin to be begun a year before Greek.			5 p. a wk.	4 p. a wk.	4 p. a wk.
3. ENGLISH . . . . .	Pupils to reproduce orally stories told them, to invent stories, and describe objects.		Supplementary reading begun—and continued through all the grades. Composition begun—writing narratives and descriptions—oral and written exercises on forms and the sentence.			From this grade no reader to be used.	Grammar, 3 p. a wk.		Literature, 3 p. a wk. Composition, 2 p. a wk.	Literature, 3 p. a wk. Composition, 2 p. a wk.	Literature, 3 p. a wk. Composition, 1 p. a wk. Rhetoric, 1 p. a wk.	Literature, 3 p. a wk. Composition, 1 p. a wk. Grammar, 1 p. a wk.
4. MODERN LANGUAGES . . . . .					Elective German or French, 5 p. a wk.	Elective German or French, 4 p. a wk.	Elective German or French, 3 p. a wk. at least.	Elective German or French, 3 p. a wk. at least.	The language begun below, 4 p. a wk.	The same language, 4 p. a wk. Second language, 4 p. a wk.	The same language, 4 p. a wk. Second language, 4 p. a wk.	The same language, 4 p. a wk. Second language, 4 p. a wk.
5. MATHEMATICS . . . . .	Arithmetic during first eight years, with algebraic expressions and symbols and simple equations—no specific number of hours being recommended.				Concrete Geometry, 1 p. a wk.	Concrete Geometry, 1 p. a wk.	Concrete Geometry, 1 p. a wk.	Concrete Geometry, 1 p. a wk.	Algebra, 5 p. a wk.	Algebra or Book-keeping and Commercial Arithmetic, 2½ p. a wk. Geometry, 2½ p. a wk.	Algebra or Book-keeping and Commercial Arithmetic, 2½ p. a wk. Geometry, 2½ p. a wk.	Trigonometry and higher Algebra for candidates for scientific schools.
6. PHYSICS, CHEMISTRY, AND ASTRONOMY . . . . .	Study of natural phenomena, 5 p. a wk. through first eight years by experiments, including physical measurements and the recommendations of Conferences 7 and 9. [Committee of Ten.]								Elective Astronomy, 5 p. a wk. 12 wks.		Chemistry, 5 p. a wk.	Physics, 5 p. a wk.
7. NATURAL HISTORY . . . . .	Through first eight years, 2 p. a wk., of not less than thirty minutes each, devoted to plants and animals; the instruction to be correlated with language, drawing, literature, and geography.								One yr. (which yr. not specified) 5 p. a wk. for botany and zoölogy. Half-yr. (late in course), anatomy, physiology, and hygiene, 5 p. a wk.			
8. HISTORY . . . . .					Biography and Mythology, 3 p. a wk.		American History and Elements of Civil Government, 3 p. a wk.	Greek and Roman History, 3 p. a wk.	French History, 3 p. a wk.	English History, 3 p. a wk.	American History, 3 p. a wk.	A special period intensively, and Civil Government, 3 p. a wk.
9. GEOGRAPHY . . . . .	Time allotted in first eight years to equal that given to number work. The subject—the earth, its environment and inhabitants, including the elements of astronomy, meteorology, zoölogy, botany, history, commerce, races, religions, and governments.					Physical Geography.	(Physiography, geology, or meteorology at some part of the high school course; possibly more than one of these where election is allowed.)			Elective Meteorology, ½ this year or next.		Elective Geology or Physiography, ½ year.

Abbreviations: p. = a recitation period of 40-45 minutes; wk = week; yr. = year.

SUBJECTS				
1st Year	2nd Year	3rd Year	4th Year	5th Year
1. LATIN	2. GREEK	3. ENGLISH	4. MODERN LANGUAGES	5. MATHEMATICS
6. PHYSICS/CHEMISTRY/ASTRONOMY	7. NATURAL HISTORY	8. HISTORY	9. GEOGRAPHY	10. ECONOMICS
<p>11. AGRICULTURE</p> <p>12. MEDICINE</p> <p>13. LAW</p> <p>14. ENGINEERING</p> <p>15. ARTS</p> <p>16. MUSIC</p> <p>17. SPORTS</p> <p>18. MILITARY</p> <p>19. NAVY</p> <p>20. AIR FORCE</p> <p>21. ROYAL ARMY MEDICAL CORPS</p> <p>22. ROYAL AIR FORCE MEDICAL CORPS</p> <p>23. ROYAL NAVY MEDICAL CORPS</p> <p>24. ROYAL ARMY VETERINARY CORPS</p> <p>25. ROYAL AIR FORCE VETERINARY CORPS</p> <p>26. ROYAL NAVY VETERINARY CORPS</p> <p>27. ROYAL ARMY MEDICAL DEPARTMENT</p> <p>28. ROYAL AIR FORCE MEDICAL DEPARTMENT</p> <p>29. ROYAL NAVY MEDICAL DEPARTMENT</p> <p>30. ROYAL ARMY VETERINARY DEPARTMENT</p> <p>31. ROYAL AIR FORCE VETERINARY DEPARTMENT</p> <p>32. ROYAL NAVY VETERINARY DEPARTMENT</p> <p>33. ROYAL ARMY MEDICAL SCHOOL</p> <p>34. ROYAL AIR FORCE MEDICAL SCHOOL</p> <p>35. ROYAL NAVY MEDICAL SCHOOL</p> <p>36. ROYAL ARMY VETERINARY SCHOOL</p> <p>37. ROYAL AIR FORCE VETERINARY SCHOOL</p> <p>38. ROYAL NAVY VETERINARY SCHOOL</p> <p>39. ROYAL ARMY MEDICAL COLLEGE</p> <p>40. ROYAL AIR FORCE MEDICAL COLLEGE</p> <p>41. ROYAL NAVY MEDICAL COLLEGE</p> <p>42. ROYAL ARMY VETERINARY COLLEGE</p> <p>43. ROYAL AIR FORCE VETERINARY COLLEGE</p> <p>44. ROYAL NAVY VETERINARY COLLEGE</p> <p>45. ROYAL ARMY MEDICAL REGIMENT</p> <p>46. ROYAL AIR FORCE MEDICAL REGIMENT</p> <p>47. ROYAL NAVY MEDICAL REGIMENT</p> <p>48. ROYAL ARMY VETERINARY REGIMENT</p> <p>49. ROYAL AIR FORCE VETERINARY REGIMENT</p> <p>50. ROYAL NAVY VETERINARY REGIMENT</p>				



## CHAPTER IV.

## PRINCIPLES OF KNOWLEDGE.

THE laws according to which knowledge develops in the mind, are termed *Principles of Knowledge*. These principles are ascertained by inquiry into the *constitution* of knowledge.

**Ideas and Names.** (I.) The reader may not know the names of some parts of the pair of scissors on the table before him, and yet be quite familiar with the qualities and uses of those parts. The difficulty of finding words to express certain ideas is a common experience. In the natural course of things names are quite unnecessary in forming ideas, and are subsequently added to ideas to record and communicate them. The possibility of writing, speaking, and spelling words before their meanings are known, is only an apparent exception to the law exhibited in the foregoing description; in such cases of spelling, etc., words are simply so many sounds, marks, etc., and not really names or signs or symbols of ideas. Thus we infer that *Ideas precede names and signs*. In accordance with this principle new words should generally be introduced in connection with the objects, qualities, actions, and ideas of which they are the names. The rule should be: The idea first, and then the name. The violation of this simple law has many penalties.

**Ideas and Truths.** (II.) The reader had arrived at the ideas of which *Rose* and *plant* are the names before he formed the judgment, or thought, that a rose is a plant. This judgment, indeed, presupposes the formation of the ideas of which it is composed, and was impossible prior to the formation of such ideas. All thoughts are formed in the same way. Now, thoughts that are true are termed Truths. Thus it is found

to be a law that *The formation of ideas precedes the process of arriving at truths.* According to this principle those ideas which must be presupposed in the formation of any judgment, or thought, should be developed before the attempt is made to form the judgment in question. In other words, the rule should be: Ideas first, and then truths. The violation of this almost self-evident principle has brought innumerable woes to pupils of arithmetic, grammar, geometry, etc.

**Concrete and Abstract Ideas.** (III.) Our first idea of such qualities as redness, hardness, gratitude, etc., came to us in connection with beings that were red, hard, grateful, etc. Such ideas are termed Concrete Ideas. In time it became possible for us to think of redness, hardness, gratitude, etc., without necessary reference to objects, persons, etc. Ideas which the mind can think, and upon which, for the time being, it can dwell without necessary reference to objects of sense, etc., are termed Abstract Ideas. The process of arriving at abstract ideas is always the same. The law, therefore, is that *Concrete ideas precede abstract ideas.* According to this principle abstract ideas presuppose corresponding concrete ideas as stepping stones. It is possible, of course, to have approximately correct ideas of qualities that were never experienced in the concrete, provided that these ideas are products of synthesis, analysis, etc., of other experiences. In all such cases, however, the ideas at which the mind arrives are likely to be vague and even false. The rule should be: From the concrete to the abstract. This rule means that it is the instructor's first duty to develop concrete ideas in the minds of his pupils. The second duty is to transform concrete into abstract ideas. In this process the pupil should not be hurried beyond his capability, nor should he be allowed to remain too long in the concrete. In the first case the result is always confusion; in the second, the result is intellectual shortage. Since generalization, the ultimate stage in the formation of ideas, presup-

poses abstraction, the principle just stated, and its requirements, are among the most important things in the problem of education.

**Particular and General Ideas.** (IV.) The whole number of individuals which have the same nature constitute a genus, as *birds, horses, etc.* Our first knowledge of oranges, friends, etc., was a knowledge of individuals and not of the genus. In time, because we knew more oranges, etc., and found that all individuals resembled each other in certain respects (this implies memory), we began to think of these individuals as a genus. In other words, we concluded to classify all the individuals of the same nature, however many there might be, in one class, though we might never, as is generally the case, personally know all the individuals. This cumulative formation of ideas, first of individuals, and then of the genus, illustrates a mental law which may be stated as follows: *General ideas develop from particular ideas.* According to this principle the development of general ideas requires the observation of individuals of the genus in question, as birds, apples, etc. This requirement is fundamental in the development of knowledge. The process of observation must, however, be supplemented by induction, the means in generalization. The neglect of this second requirement causes want of system and organic unity of ideas, a thing very much to be deplored.

**Facts and Principles.** (V.) The reader knew what was true about some people before he could arrive at any conclusion about all people. In time, because he knew more people and found the same thing true of each person (this implies memory), the reader concluded that the same thing, as *mortality*, will be true in all cases. The reader's experience illustrates a mental law which may be stated as follows: *General truths (principles) develop from particular truths (facts).* This conclusion of experience is confirmed by the relation of judgment and reasoning, the functions employed in arriving at facts and

principles respectively. According to this principle of knowledge, the necessary stages in the development of a general truth, as *Matter has weight*, are observation and induction. In other words, the ideas at which we arrive by way of the senses or consciousness must be united by direct comparison into positive or negative judgments, as *Iron, air, etc., have weight*, and then the thought that *Iron, air, etc., have weight*, must be taken as true of all matter, which amounts to the conclusion that *All matter has weight*. Put in the form of a syllogism the argument in question may be stated as follows: Iron, air, etc., have weight; Iron, air, etc., are representative forms of matter; Therefore all matter has weight. Observation and induction are complementary processes in the development of general truths; without the former, the process of generalization is impossible for want of materials, and without the latter our thoughts could not be organized into a system. Since system is the end in view in the development of knowledge, obedience to the principle in question is of fundamental importance to teaching. For a complete explanation of this subject Methods-students must refer to logic.

**Causes, Laws, and Classes.** (VI.) The reader will remember that among the earliest interests of his life was the interest in *causes*, or powers. The questions which children ask along this line are legion. *Laws*, or, the invariable behavior of causes, is probably the most common subsequent interest. In other words, adults as well as children do not only desire to know why a thing exists in the form in which it does exist but also whether it will always be so. Thus, for example, they wish to know why the Autumn leaves fall, and then whether they will fall every Autumn. The desire to *group* individuals on the ground of essential resemblances and differences generally follows interest in causes and laws. It is true that the habit of grouping objects and events on the ground of sensible and practical resemblances and differences may be

developed very early in life, but such convenient classification ignores the essential resemblances of cause and law. That the natural order of inquiry into causes, laws, and *scientific* classes, is the one just presented, is plainly confirmed by the fact that "the ancients early made inquiries after the causes in natural philosophy and astronomy, while the attempt to ascertain the laws is of much more recent date," and by the fact that "the scientific classifications of Natural History are much more recent than those of Natural Philosophy, Astronomy, etc." Thus we find that *Causes, laws, and classes, form a natural series for the mind.* The relation of causes, laws, and classes, makes the order just presented a logical order. In other words, a knowledge of law (invariable behavior of a cause) presupposes the study of causes under many and various conditions, and this study requires time. Moreover, scientific classes consist of individuals whose causes and laws as well as other properties are the same in nature, so that a knowledge of causes and laws is presupposed. For the complete method of proving causes, laws, and scientific classes, see logic.

According to the principle just stated, the study of causes should generally precede that of laws, and the study of scientific classes should come last. There are cases, however, where the law will present itself to the mind before the cause, and the class before the laws and causes. This is especially true of cause, law, and class, of "positive" and "mechanical" cases. It is generally best to develop causes and laws together, classes being taken up somewhat later. This has become the rule, for example, in taking up history and physics before biology.

**Order of Facts of Sciences.** (VII.) All sciences (Psychology of the Sciences) are syllogistic processes. The premises, however, do not have the same *sources*. (1) In the natural sciences and mathematics, observation is perceptive,

whereas it is introspective in the mental sciences, *i.e.*, in those based upon consciousness. (2) The abstractions of the natural sciences and mathematics, *i.e.*, the ideas of space, number, time, equality, etc., are comparatively near the concrete, and therefore readily realized; but the abstractions of the mental sciences, especially of ethics and æsthetics, are idealities, *i.e.*, they cannot be completely realized. (3) Moreover, the elementary thoughts (premises) of the mental sciences, whose logical subject is some experience of sense or consciousness, and whose logical predicate is some abstract concept, are less inevitable in the mental sciences than in the natural sciences and mathematics. Thus we conclude that *The facts of the natural sciences and mathematics precede those of the mental sciences.* According to this principle the course of elementary schools should begin with object lessons and numbers together with so much language, art, history, etc., as can be mastered by the child.

**Order of Principles of Sciences.** (VIII.) The great truths of mathematics were known to the ancients. The natural sciences have only lately begun to mature. Some of the mental sciences are even now only in their infancy. This order stands out as the law of the sciences, which may be stated as follows: *The principles of mathematics precede those of the natural and the mental sciences.* The relation of the sciences (see chapter on The Nature of Knowledge) makes the order just stated a logical necessity: (1) The natural sciences cannot be completely developed without mathematics; and (2) The higher mental sciences presuppose a thorough knowledge of mathematics and natural sciences. This conclusion is also supported by the fact that the second premise (see Psychology of the Sciences) of the mathematical syllogism contains nothing gratuitous, whereas that of the natural and the mental sciences does. This gratuitous factor is most difficult to deal with in the mental sciences. According to this principle of

knowledge mathematics should be made fundamental in higher education. Logic should follow, for, although it is a mental science, it is the indispensable preparation for systematic thinking in the natural sciences. A course in physics, chemistry, biology, etc., should precede systematic inquiry into the higher mental sciences.

**Philosophy.** (IX.) Master minds of all ages have tried to arrive at the ultimate principles of the physical and moral universe. In these attempts it was often necessary to criticise the methods and conclusions of the sciences. Critical inquiry into the possibility, certainty, and limits of knowledge, was the task of the sceptical Kant. Modern philosophy inquires into the postulates of the various sciences as well as into the principles at which these sciences arrive. The truths at which the particular sciences have admittedly arrived are then synthetically summed up into ultimate principles, the purpose being to construct a system in which the phenomena of matter and mind are found to be the creative and regulative manifestations of the One never self-contradicting and First Cause—God. This complex syllogistic method is termed *Philosophy*. It is accordingly an abstract, speculative task, and one which presupposes cyclopedic knowledge together with great logical ability. Thus we conclude that *Philosophy presupposes the sciences*. According to this principle of knowledge, philosophy should come last in a course of studies. In most cases a thorough college course should constitute the preparatory training.

**Correlation of Sciences.** (X.) The study of any branch of knowledge both presupposes and leads up to other branches, so that it seems absolutely impossible to isolate any species of knowledge from any other. (See "Correlation.") This genetic contact of the various species of knowledge is ably discussed by Dr. Arnold Tompkins, in his "Philosophy of Teaching," and by "The Committee of Fifteen." The great truth here

in question is recognized in the "group" system of studies as offered by colleges in our days. The "eclectic" courses offered by several noted institutions are also based upon the partial recognition of the principle, which may be stated as follows: *The various species of knowledge are correlate.*

According to this principle the daily "programme" of all grades of schools should bring the pupil in contact with natural sciences, mathematics, and mental sciences. The principle of "correlation" (see Principles of Culture) must, of course, determine largely what the branches shall be. This principle reaches its limits in the university, where, after a general course, the student may wish to make some field of knowledge a specialty (concentration), but even this special course cannot be pursued to the best advantage unless the student has passed through a correlated general course. The principle also finds its limits in technical and professional schools, where it must often be abandoned for practical and economical reasons.



## CHAPTER V.

## PRINCIPLES OF INSTRUCTION.

THINGS done for the pupil's increase of knowledge, are termed Instruction, from the Latin words *in*, into, and *struo*, I build. The instructor, accordingly, is a builder of ideas and thoughts, and his world is the pupil's intellect. And yet he is a builder only in so far as he causes the pupil himself to build. (See principle I., Nature of Education.) When, in supervising the activity of learners, the teacher becomes the best stimulus and guide, he is the *ideal* instructor. (See principle II., Nature of Education.) Although instruction, since its ends are purely intellectual, is not coextensive with culture, whose ends are emotional and volitional as well as intellectual, culture should nevertheless always be one result of instruction. In this work of instruction, as well as in that of culture, the teacher must conform with certain laws, to which, as we learn from the nature of culture and knowledge, the development of ideas and thoughts is subject. The general truths in question are termed *Principles of Instruction*.

**Adaptation of Lessons.** (I.) The pupil who must overwork himself again and again in learning lessons, as happens when promotions are premature, is in danger of stunting the functions used in his efforts and may become a total dwarf. The pupil who tries hard, but fails again and again to master lessons assigned to him, is in danger of losing faith in his powers, or comes to believe that his teacher lacks sense in assigning lessons. Other bad results may follow. Thus we conclude that the learner should not be tried beyond his present powers.

On the other hand, the pupil who is not required to put

forth vigorous efforts in learning the lessons assigned to him, will soon come to consider himself smart, and waste his leisure time in mischief, or else leave the school in disgust. It follows that the learner should exert himself up to his capacity and in harmony with the stage of his development. (See chapter on Laws of Mental Activity.) After ascertaining as nearly as possible what the pupil can learn, the instructor should assign such lessons and make such promotions as are exactly suited to the present powers of the learner. In short, *The matter of instruction ought to be adjusted to the present powers of the learner.*

In order to find out just what is to be expected of the learner, inquiry must be made into his age, talents, habits, peculiarities, previous advantages, etc., and then he must be tried on tentative lessons. If the pupil is responsive and successful when thus tried, the instructor need not hesitate to proceed.

**Succession of Lessons.** (II.) Perception presupposes sensation and consciousness, abstraction presupposes perception, generalization (conception) presupposes abstraction, judgment presupposes ideation, syllogism presupposes judgment, etc. In short, we see that the progressive route of thought begins with sensation and ends in syllogism. (See the Laws of Mental Activity.) But the mind also tends to traverse a regressive route, the direct opposite of the progressive steps. This regressive activity is necessary to assure the mind of the grounds upon which its advances were based and in order to give greater and better content to each progressive step.

It must, therefore, be inferred that concrete lessons should precede abstract lessons, and that abstract lessons should be reinforced when necessary by reverse reference to the concrete; that wholes should be decomposed, and parts composed into wholes; that particular truths should be fused into general truths, and that general truths should be realized in particular,

practical truths ; that judgments should be gathered into syllogisms, and conclusions traced back to their premises. (See the Principles of Knowledge.)

The species of knowledge which thus correspond to the necessary precedences in the functional activity of the mind, and which precede and follow one another by reason of functional precedences, are said to be in logical relation with each other. The logical trend just noticed indicates the steps to be required of learners. In short, *The learner is to be conducted from that which he knows to that which is in logical relation with it.*

According to this principle it is not proper in arithmetic to study percentage before fractions, or fractions before the "fundamental operations." In geometry the progress from problem to problem must be a somewhat perfect junction of syllogisms, each one paving the way for the next one and necessitating it. In any study some steps will not be possible for the learner until he has taken all the steps that lead up to the one in question. So, too, geography paves the way for history, and arithmetic for algebra ; but geography does not pave the way for algebra, nor arithmetic for history. In short, the various branches of study, as well as the various steps of a branch, should precede and follow each other in the order in which they pave the way for each other in the understanding of the learner. Some studies, indeed, will not be possible for the learner until he has learned those studies which lead up to the ones in question. (See the Principles of Knowledge, especially the Tenth Principle.) Text-books, courses of study, and daily instruction, should therefore be planned so that each step is the most natural to take. The teacher should ascertain critically just what the pupil knows, and then lead up to that knowledge to which the knowledge already acquired is the interpreting key.

**Interesting Instruction.** (III.) The will (see tenth law

of mental activity) is subject to the law of summation of stimuli, and, as may be observed in all the affairs of life, interest is the most powerful stimulus both to mental and physical activity. An interesting task is light; interesting lines of thought are almost irresistible. That lesson is most likely to be studied which is most interesting to the pupil. Indeed, it will not only be committed to memory, but also developed in the understanding and absorbed into the character.

It is almost impossible to study a lesson that is not interesting; in the absence of interest the will of the learner is weak and even rebellious, and that, too, at times, in spite of duty or entreaty. The pupil may be compelled to repeat the words until he can recite the lesson, but that is mechanical association, and the result, except where such association is the essential thing, as in spelling or committing extracts, is of little value, if not an actual injury to the mind.

Thus we see the importance of enlisting the pupil's interest in his lessons. The lessons must therefore be adapted as exactly as possible to the learner's present powers and to the logical needs of his present understanding (First and Second Principles of Instruction); for apart from such adaptations they are not interesting as a rule. When all this has been done, it may still be necessary to lead the learner to discern some distinct, some ultimate worth in those lessons which, in spite of adaptations to his needs, do not have any intrinsic worth for his present judgment and mood. All these adjustments and preparations should be made in the assignment of lessons. In short, *The possibility of interesting the learner is to be considered in determining what instruction to give.*

**Needs of the Whole Pupil.** (IV.) Three requirements as to the matter of instruction have been noticed: (1) The matter of instruction ought to be adjusted to the present powers of the pupil. (2) The learner is to be conducted from his present knowledge to that which is in logical relation with it.

(3) The possibility of interesting the pupil is to be considered in determining what instruction to give. But the functional development of the pupil, as well as the logical junction of the lessons to be learned and the interest taken in these lessons, will have ulterior consequences of the most tremendous significance in religious, moral, practical, æsthetic, and physical matters. In other words, the superior and ultimate prosperity of the whole pupil is affected by the course of studies upon which he occupies his mind. This is the fundamental presumption of education. Thus we see the importance of taking into account all the needs of the pupil in choosing a course of lessons for him. The proper questions for the instructor are therefore as follows: (1) With what objects are the senses of the pupil to be occupied? (2) With what contents is the memory to be filled? (3) Upon what materials should imagination operate? (4) From what mass of experiences should the mind cull its concepts? (5) Within what domain, practical, moral, religious, etc., should the understanding try to cognize relations? In short, *The needs of the whole pupil are to be considered in determining what instruction to give.*

**Right Method of Instruction.** (V.) It is one thing to settle *what* instruction ought to be given, and quite another thing to settle what the *method* of instruction ought to be. But if it is true that the learner ought to be conducted from his present knowledge to that which is in logical relation with it (Second Principle of Instruction), then it is evident enough that the logical junction, whatever it may be, which exists between that which is known and that which is to be learned, must be the transition to be required of the learner.

The logical trend (see the Second Principle of Instruction) is from the whole to its parts, as in a spoken word and its sounds, or a sentence and its elements; from the parts to the whole, as in sentence construction or addition; from the concrete to the abstract, as in geography or arithmetic; from the

abstract to the concrete, as in reading or algebra; from the simple to the complex, as in generalization and classification; from the particular to the general, as in learning causes, laws, conditions, etc., through observation and hypothesis; from the general to the particular, as in working problems according to rule, or in obedience to laws; from practice to theory, as in explaining processes, or justifying courses of action; from theory to practice, as in the application of philosophy or science to the tasks of life. Accordingly we conclude that analysis and synthesis, induction and deduction, are the essential forms of instruction. It is deemed of the utmost importance to require the pupils to take these steps as the necessity of the case may dictate, and always with due inquiry into the ability and interest of the learner. (See First and Third Principles of Instruction.) The mind developed in accordance with this law will attain not only to extensive knowledge, but to the highest wisdom. Accordingly, *The logical relation of that which is known to that which is to be learned determines the true method of instruction.*

**Right Mental Activity in Instruction.** (VI.) That which is required of pupils in preparing a lesson and reciting it, does not generally necessitate the employment of those functions which ought to be employed. (1) Many teachers do not make it necessary for their pupils to use their imagination and understanding in studying and reciting a reading lesson. (2) Too much oral spelling is allowed, seeing that the eye and hand are the better media of memory in spelling. Such a thing as inductive thinking in learning to spell is almost unknown, and yet that is essential to highest attainments in spelling. (3) Writing is taught without strong appeal to the pupil's sense of the appropriate and the beautiful. The will is seldom required to put forth its best efforts in penmanship, and yet that is in nine cases out of ten the surest road to success with the pen. (4) A parrot-like repetition of the text is often all that

is required of pupils in geography, whereas observation, imagination, and reasoning are of the highest importance. (5) The same folly is common in teachers of history and composition. (6) Pupils are allowed to commit grammar, geometry, etc., whereas observation, judgment, and all the modes of reasoning are essential.

The results, intellectual, moral, and practical, are deplorable. The teacher that knows no better, or, knowing better, fails to do better, is evidently out of place in the school-room. In order to improve the functions of the pupil as a whole, and to instruct him in the highest sense, the teacher must require of him that study and those tests which necessitate the most appropriate and the most essential mental activity. In other words, *The method of instruction should necessitate in learners the employment of those mental functions which ought to be employed in learning that which is to be learned.*

**Culture of Instruction.** (VII.) "In learning anything there are two points to be considered; 1st, the advantage we shall find from knowing that subject or having that skill, and 2d, the effect which the study of that subject or practising for that skill will have on the mind or body." The latter consideration is regarded of primary importance in education. But it does not follow that a course of instruction, even if it employs the functions which ought to be employed, improves those functions to the utmost limit. And this failure is due to improper employment of the functions in question. When, for example, the senses are not required to be used with interest and attention, or the memory is only mechanical association, or judgment goes unchallenged, or reasoning is deductive when it should be inductive and *vice versa*, the results will of course be disappointing. In such cases the pupil will not gain strength, nor better his habits and interests, and his grandest possibilities may be destroyed or go unused. It is only when functions are employed in accordance with the laws

of psychic activity (see the chapter on Methods of Culture) that they improve as they can and should improve. Accordingly, *The methods of instruction should necessitate such employment of functions as duly improves them.*

**Emancipation in Instruction.** (VIII.) A time should come when a learner may be safely put in charge of himself, a time when he ought to take his own destiny into his own hand, a time when he may become at least one of his teachers, and that a most effective one. (See the Third General Principle of Education.) In order that this point in the development of the pupil may be reached, he must be required to study as he should study until it becomes his established habit to study in that way, and until his interests as well as his power, are such as to warrant his emancipation from an instructor's authoritative tutelage. In other words, *The method of instruction should tend to free the learner from the necessity of supervision.* But what are the habits and methods and moods of study that should be cultivated in the pupil in order that he may attain freedom from an instructor's authority and supervision? These habits, etc., have been indicated in the chapters on Methods of Culture and Principles of Instruction. To these chapters the reader is expected to refer. Foremost among other things it should be required of learners to be observant, earnest, accurate, industrious, reflective, and systematic.

**Specific Methods of Instruction.** (IX.) The public schools dare not forget that in general at least their mission is practical as well as cultural, but it is not to be required of them, nor to any great extent, of the colleges, to train directly for special professions, arts, or destinies. The latter training is the professed and essential mission of technical schools.

In technical schools it is a duty to do whatever can be done to fit the pupil for specific vocations. Accordingly, the course



of study and the methods of instruction, as well as those of culture, are to be adapted to the ends in view. The methods of instruction in particular ought to necessitate in learners the formation of those habits and moods which will be of most service in specific vocations. In some vocations the great need is skill in analyzing; in others it is skill in synthesis, or induction, or deduction, or a number of these, perhaps all of them. In many occupations the work is concrete; in others it is more abstract. In some arts earnestness or industry is most necessary; in others, system or accuracy. Thus, *Specific methods of instruction are to be employed in fitting pupils for specific vocations.*

**Ideal Instruction.** (X.) Ideation, as psychology teaches, begins in perception, if things, as plants, birds, etc., are the objects of thought, and in consciousness, if "self" is the object in question. In abstraction external and internal qualities, as solidity, conscientiousness, etc., become the objects of thought. Abstraction, accordingly, is the second stage of ideation. The third and final stage of ideation is the cumulative process, commonly termed generalization, by which the mind builds object-concepts, as vertebrates, emotions, etc., and quality-concepts, as transparency, intensity, etc. If the mass of experiences out of which object-concepts and quality-concepts are formed is acquired through perception together with memory, generalization is termed external apperception, but if the origin of the experiences in question is consciousness, generalization may be termed internal apperception. In this complete process of ideation, memory preserves and imagination enlarges experience. Direct comparison, or judgment, is essential to abstraction, or analytic attention, while indirect comparison, or reasoning, although apparently absent in many cases, is always essential to generalization, or synthetic attention.

By direct relation, or judgment, ideas become the subjects

and predicates of logical judgments, and judgments containing "middle" terms become premises of syllogism, or indirect relation, the inductive syllogism ending in opinion or truth that must in turn become the point of departure for many practical deductions, as rules and methods. No science or philosophy has ever been developed in any other way, nor given birth to any art by any other process.

The series to which attention has been called, exhausts, as psychology shows, the possibilities of the human intellect. To complete the series should therefore be the end in view in instruction. This requirement harmonizes with the principles of correlation, concentration, and knowledge, and it cannot be inconsistent with the demands of life, unless life and mind be contradictions. In this treatise the term observation will be used to designate ideation in connection with direct relation of ideas. Induction and deduction, according to the fifth principle of knowledge, are the successive phases of indirect relation of ideas. Accordingly, *The successive requirements of ideal instruction are observation, induction, and deduction.* This method of instruction is sometimes called "psychological," because it satisfies mental requirements, and "scientific," because the end in view is complete knowledge.

PART III.  
METHODS OF TEACHING.



## CHAPTER I.

## METHODS OF MENTAL CULTURE.

IN our inquiry into the nature of education and the principles of culture, it was found that SELF-ACTIVITY was the basis of education, but that STIMULUS and REINFORCEMENTS were necessary supplements of self-activity. Ideal methods of culture must satisfy these requirements. It is proposed, therefore, to point out in this chapter the required means in the cultivation of the intellect, sensibility, and will, and to show how these means may be made most effective.

**Perception.** The appropriate means in cultivating perceptive power and right perceptive habits are as follows:

1. *There must be general and habitual observation.* Mental activity begins in the senses. The little ones are all ear and eye and hand. This fervent inquisitiveness of childhood, alas, too often ceases when childhood ceases. There is too much caprice in our use of the senses. Most people see and hear only what they cannot avoid. Education should lead us to look all around, over head and under foot, into crevices,—everywhere except where looking would be sin or evil. This is what is meant when it is said that observation should be general. Then, too, observing should become a habit with us, *i.e.*, we ought to make observing a business rather than a matter of fits and starts. It is in this business-way that the mind must get its necessary stock of concrete ideas.

2. *There must be frequent and well-planned observation lessons.* There are daily opportunities for these lessons, though they may be given less often, according to circumstances. They should be lessons on Form, Color, Parts, Qualities, and on the Elements of Mineralogy, Botany, Zoölogy, and Physi-

ology. Some lessons on Chemistry and Natural Philosophy are very much in place. These lessons should always be suited to the stages of the child's development. Moreover, they should by all means be interesting, instructive, and beneficial lessons.

3. *The objects studied should be described and sketched if possible.* If at first children happen to be timid, they should be assisted in describing and sketching. In a short time pupils will take courage and enjoy these exercises. It is only when children are required to describe and sketch objects that exact and industrious observation will become a solid habit.

**Memory.** In order to develop memory in pupils, the teacher should observe the following suggestions:

1. *Develop real interest in that which is to be committed.* The mental excitement denoted by the term interest is at the same time a nervous excitement, and for that reason results in definite neurosis. This explains why interesting facts are so easily retained and so completely recalled at pleasure. Accordingly, if that which is to be committed happens not to be interesting in itself, as in the case of the multiplication table or spelling, it is the teacher's business to put interest into it, as when he points out to pupils the convenience of the multiplication table or the necessity of orthography. The teacher will be able to make many uninviting lessons interesting, sometimes through illustration, sometimes by argument or explanation, and sometimes by personal enthusiasm or moral influence.

2. *Develop true attention.* When the work to be done by memory is interesting, the mind becomes attentive of its own accord. But in many cases pupils must be required to commit and reproduce facts that are far from being interesting. Then, too, even interesting facts do not adhere to memory when they come in too great numbers or too rapidly. In such cases voluntary effort must be put forth in committing and

recalling. The strongest effort usually results in the most definite neurosis, and thus in the best memory. Accordingly, it becomes the teacher's business to cultivate concentration in his pupils, not its semblance, but the very thing itself. He can do this in various ways, but especially through his own example, as well as through tasks in which such concentration is essential.

3. *Require frequent repetition.* Words and facts "committed to memory" do not by this committal become possessions or contents of which the mind continues to be conscious in an unbroken stream from the moment of their commitment, but the act of committing affects more or less permanently the nervous apparatus which is in the employ of memory. It is through revival of these former neural activities that the mind in its present junction with the body must arrive at "second editions" of its former contents, *i.e.*, at a repetition of its former activities. This psychic repetition is either simple "remembrance" or "recollection," the former being a revival without voluntary effort, the latter a voluntary one. For the degree of its success this mental repetition must obviously depend on two conditions: (1) How thoroughly was the nervous apparatus affected in committing? and (2) How securely have these imprints on the nervous apparatus been retained?

Thus it appears that words and facts which are not to be forgotten must be repeated again and again with most faithful perseverance, first at short intervals of time, and then at longer intervals. Indeed, these repetitions, or reviews, ought to be so frequent as to result in neural ownership, or habit, *i.e.*, a persistent possession in the nervous apparatus through which alone, in the present junction of body and mind, memory is possible. In that event recollection and recognition will be an easy revival in consciousness through the medium of easy neurosis. Thus, for students who will put forth vigorous and

persevering efforts, it is possible to master vocabularies, declensions, inflections, idioms, extracts, rules, principles, etc. Accordingly, in the cultivation of memory it is of the utmost importance to require frequent repetition.

4. *Have pupils commit many extracts of prose and poetry.* It is impossible to name a function of body or mind that does not improve through appropriate exercise. It cannot be proved that memory is an exception to this rule. Indeed, observation and experience go to show that among the functions of the mind none is more capable of improvement through exercise than memory. Inasmuch, then, as exercise is to be given to memory, it is well for obvious reasons to select such tasks as may indirectly promote practical, moral, and æsthetic understanding, and language, as well as memory. This will be hitting two birds with one stone. Accordingly, pupils should be required to commit many extracts of prose and poetry. These extracts should be adapted to the child's stage of development—especially to his understanding—and they ought to be such as will serve not only to fix linguistic moulds for the child, but also true views of life and destiny.

5. *Help the child find the best cohesions in committing.* It is of the highest importance to understand that which is to be committed. In that case words and facts will cohere more effectually in consciousness, and their imprints in the nervous apparatus will be more directly connected and hence more readily restored. Moreover, through the interest and attention that usually attach to what the mind understands, the nervous imprints will be more definite and therefore more enduring. Therefore, the cohesions in committing should be evident, and natural, *i.e.*, not forced; and logical, *i.e.*, connected as cause and effect. In addition to this, the mind should be in a responsive mood and the body ready for service to the mind. Thus appears the propriety of studying certain lessons, with a mind that is free from preoccupation or worry, and at



those times of the day when the nervous system is more vigorous. In other words, the best cohesions in committing result from the completest obedience to the "laws of association." (See text-book on Psychology.)

**Imagination.** The importance of cultivating imagination until it becomes what it ought to be in quantity, propensity, and quality, is too often forgotten by teachers. In this work it is well for teacher and pupil to heed the following suggestions :

1. *Observe that which is lovely and inspiring everywhere in Nature.* Sensation stimulates imagination ; it is an indispensable stimulation ; its quantity and quality have much to do with the quantity and quality of imagination. Thus arises the importance of choosing our sensations, if we would improve our imagination. In most people there is enough imagination, but so often it is of a poor quality. This ought to be remedied. Accordingly, it is imperative to observe the lovely and inspiring everywhere in Nature. Those who hope to live in a world of their own construction, sublime and beautiful, must be much in contact with the sights and forms and sounds of the world which God has made. In other words, it ought to be a habit of ours to seek the quiet valley and the murmuring stream, sweet birds and flowers, starlight and the azure sky. And again we ought to know majestic mountains, mighty rivers, foaming cataracts, the storm, the sea.

2. *Observe that which is lovely and inspiring in Art.* The works of Art, though far inferior to the works of God, are very lovely and inspiring. Architecture, sculpture, painting, music, poetry, and fiction, have created for the eye and the ear and the hand what these need in order to stimulate imagination. Those who would expand their little world beyond its narrow real limits may do so in the presence of majestic temples, graceful statuary, the paintings of the Masters, tender or majestic music, poetry, and fiction. The figures of the poet,

the characters and events of fiction, etc., all tend to stimulate and refine imagination in those who read and see and hear.

3. *Enrich the mind with lovely and inspiring memories of Nature and Art.* The same nervous apparatus is active in sensations and their reproduction, *i.e.*, the neural process of memory is simply a reproduction—however faint it be—of past sensations. It is obvious, therefore, that, if sensations stimulate imagination, their reproduction in memory will do so too. Indeed, the psychic phase of memory (the “second editions” proper) is itself a species of reproductive imagination. From this reproductive phase of imagination to its productive phase the transition is spontaneous. Thus arises the great importance of stimulating and purifying and ennobling imagination through restoring “memories” of those things which are lovely and inspiring in Nature and Art. This habit of recalling what was seen and heard in field and forest, among birds and flowers, as well as in galleries of Art, or in books, is not only a delightful habit, but one that tends to develop imagination into an inner world of beauty and sublimity, loveliness and splendor, grace and majesty.

4. *Make associates of imagination and thought.* In many branches of study it is possible to employ the imagination in helpful connection (see the Second Principle of Culture) with “thought.” This is especially the case with geography, history, geometry, physical science, and literature. In all these connections thought becomes the reinforcement of imagination.

**Thought.** According to the first principle of culture, the fundamental thing in the cultivation of “thought,” is *practice in judging and reasoning*. In the earlier stages of thought, the concrete and particular are the most effective *stimulus*; in the later stages the abstract and general should be gradually substituted. In these transitions the teacher must be guided by the measure of the pupil’s interest and ability. Inductive and deductive thought should generally be *correlated*. The

cultivation of thought need not be deferred, as Rousseau seemed to think, to the grammar school period, but should begin, as psychology teaches, in the lower grades. The common school branches are the teacher's convenient means not only in lower, but also in higher grades. History, geography, grammar, and arithmetic, are best suited to the grammar school age. Physical geography, geometry, and algebra, together with botany and natural philosophy, are suitable for high school pupils. General history, psychology, and the classics, are useful means in Normal schools and colleges.

**Sensibility.** The following suggestions will be found good rules in the cultivation of the feelings. These rules, inferred from psychology, are based upon the relation of the feelings to intellect and will.

1. *Surround the pupil with ennobling influences.* The heart is a harp of a thousand strings; it vibrates with the slightest touch; it moves in response to all that comes to it through intellect and sense. Thus it becomes possible to cultivate the feelings by means of books, pictures, companions, Nature, Art, etc. The teacher should never grow weary in trying to surround his pupils with such influences, physical and spiritual, as will tend to ennoble the emotions, affections, desires, hopes, etc., of his pupils.

2. *Resort to moral, æsthetic, and spiritual precepts.* Improper thoughts generate improper feelings, and proper thoughts, to say the least, tend toward the opposite result, *i.e.*, proper feelings. Thus it follows that the "heart" is to be cultivated through the "head." Accordingly, it is possible to improve the feelings through those precepts which improve Conscience (moral precepts), through those which improve Taste (æsthetic precepts), and through those which lift the thoughts toward God, or the things of God (spiritual precepts). These lessons may be formal, as in set talks, or informal, as in the study of biography, art, and Holy Writ.

3. *Set the pupil worthy examples.* Direct contact with a noble-hearted teacher is worth more to the feelings of pupils than all precepts put together. Pupils, so to say, absorb the feelings of the teacher, and drift into his current. It must therefore be important that the teacher cultivate propriety and vigor of feeling in himself, not only for his own sake, but also for absorption by his pupils. The study of appropriate biography will have a similar effect. "Boys Who Became Great Men," is a most excellent book for this purpose. The teacher should also see to it, whenever possible, that none of his pupils are spoiled by evil examples in school-mates.

4. *Require the pupil to master his evil impulses.* To master one's feelings absolutely, is simply impossible; and yet it is quite possible to concentrate one's thoughts more or less on worthy objects, thus breaking the tyrannous sway of one's impulses. Pupils should be incited in every possible way to think of duty, justice, mercy, truth, etc., and to dislodge all feelings that are out of harmony with better sense or sober reason. The boy that will make honest efforts to obey these higher ideas will in time develop in himself the power to subordinate his impulses to reason, and the power to master himself in most trying situations.

**Will.** Apart from intelligent vigor of will, the mind cannot develop adequately nor do its work in the world. (See "Nature of Education.") The following suggestions, based on the relation of will to intellect and emotion ("Total Interaction," page 28), are good rules in the cultivation of will.

1. *Develop noble conceptions and emotions.* It is the nature of the mind not to will except when there are motives, or stimuli. These stimuli are of two kinds, namely, intellectual and emotional. In other words, noble ideas and the feelings arising from these ideas, tend to ennoble the will, but ignoble ideas and the feelings arising from these ideas, tend to vitiate the will. The most effective motives, as we know by inquiry

into human "interests," are the ideas of utility, truth, beauty, and duty. These ideas should, therefore, be developed into intentions, or ideals, in the character of pupils. The "love" through which the ideas in question become ideals, is the strongest stimulus in life. (1) To accomplish these ends, the teacher should find or create concrete situations for his pupils, and then add such instruction as may serve his purposes. This was the method of Pestalozzi and Fenelon. Older pupils should study economics, physical and mathematical science, æsthetics, and ethics. (2) The motives, career, and destiny of historical persons, should be studied in the light of mental sciences. Older students should also study comedy and tragedy; for thus they will build up for themselves types of character with which they may compare themselves, and thus take warning from the fate of others. (3) When instruction fails, as in "The Evolution of Dodd," penalties must be inflicted; for these will often impress lessons otherwise despised and disobeyed. This is a special sphere of school management.

2. *Require vigorous activity in all tasks.* Attention and intention, as was pointed out in the chapter on mental activity, are the characteristic phases of volition, or decision. Punctual and regular attention together constitute *industry*. Persistent attention is known as *perseverance*. When any one is master of himself, as in trying circumstances or amid adverse forces, the voluntary self-mastery is termed Self-Control. Purpose and resolution are strong intentions.

It will be noticed that in all these forms of self-determination, the invariable element is effort, assertion, vigor. In short, *vigor* is the one thing to be cultivated in the cultivation of the will. It should therefore be required of pupils to be attentive, industrious, persevering, and self-possessed. The ordinary duties of study and exercise, as found in the present curriculum of schools, afford ample opportunity for the cultivation of will in pupils. The teacher should see to it that pupils try

to master practical difficulties, overcome obstacles, and put forth intelligent, courageous effort in all tasks. Gymnastic exercises are especially valuable in cultivating attention, decision, courage, perseverance, and self-control.

In the getting of an education attention is nearly everything. The same holds true of success in the various departments of life. It is therefore of the very greatest importance to cultivate attention in our pupils.

The following suggestions will aid the teacher in cultivating attention in pupils:

1. The teacher must show in his face and voice and manners that he is himself interested in the subject under consideration. The effect will be electric.

2. The teacher must use the best methods of instruction and the greatest possible skill in speech. Professional training is simply indispensable.

3. The teacher must assign such tasks in recitation and out of recitation as will require close observation and vigorous thinking.

4. The teacher must study every pupil in particular, in order to win and hold his attention.

## CHAPTER II.

## OBJECT LESSONS.

X A CORRECT conception of object lessons is of the greatest importance in determining right methods of instruction. (See the Principles of Instruction.) Two problems, therefore, deserve our attention in this chapter: (1) The Nature of Object Lessons; and (2) The Method of Instruction in Object Lessons.

## THE NATURE OF OBJECT LESSONS.

What object lessons really are, is most conveniently set forth under the following heads: (1) The Subjects of Study; (2) The Ends in View; (3) The Method of Study; and (4) The History of Object Lessons.

**The Subjects of Study.** "Object Lessons," as indicated by the name, are lessons on *objects*. But, to avoid misconceptions, it must be added that object lessons are concerned only with *sensible* objects. Any object of the pupil's environment may be studied. The object may be a product of Nature or manufacture. Object lessons in which the things with which the physical sciences are concerned, are the subjects of study, have been most appropriately termed "Nature Studies."

**The Ends in View in Object Lessons.** The ends in view, as in all studies which deserve a place in our schools, are two, namely, (1) Culture and (2) Instruction.

*Culture in Object Lessons.* Object lessons are designed to exercise the pupil's mind in such a way as to utilize and improve all its functions, but especially the perceptive function in connection with memory, judgment, and attention. The propriety of object lessons as a means of culture will be considered under the *importance* of object lessons.

*Instruction in Object Lessons.* Object lessons are also designed to equip pupils with such knowledge of their environment as will serve the practical, moral, and æsthetic ends of life. In order to accomplish this end the *forms, colors, parts, qualities, powers*, etc., of objects are made special subjects of study. The propriety of object lessons as a means of instruction will be considered under the *importance* of object lessons.

**The Method of Study.** In the study of objects the whole pupil can be at work, but all the activities into which he enters *must begin in the senses*. This is the characteristic feature of the study of objects. Conceptive and reflective attention must, however, be added to perceptive attention as necessary complements and reinforcements. (See Rosenkranz.) In the case of younger pupils, the study of objects may amount only to *observation, i.e.*, to inquiry into facts, but older pupils will seek after the general truths of phenomena and make these truths rules of conduct, *i.e.*, they will study not only by observation, but also by induction and deduction. The experiments of the physical sciences are object lessons in this higher sense.

**The History of Object Lessons.** Perhaps there never was a time in the history of education when object lessons were not regarded as an essential part of primary instruction. In practice teachers have differed considerably. Some teachers introduced such instruction as *adjuncts* of various studies. Although Locke, Comenius, and others, advocated object lessons, the credit of introducing them as a distinct method of elementary instruction is usually given to Pestalozzi. In our days the systems introduced by educators of former centuries have been expanded and perfected. Modern education lays great stress on "Nature Studies," and correlates these with literature. The Normal schools provide special courses of training in object lessons, and many writers outline systematic



courses of work for our schools. Among other suggestive authors are Sheldon, Calkins, Prince, Walker, and Ricks. The probabilities are that object lessons, though sometimes employed amiss, have come to stay in our schools. (See Importance of Object Lessons.)

### INSTRUCTION IN OBJECT LESSONS.

The following topics deserve the teacher's attention at this point: (1) The Courses of Object Lessons; (2) The Method of Instruction; and (3) The Importance of Object Lessons.

#### COURSES OF OBJECT LESSONS.

Lessons on objects should begin when the child enters school; they should continue through all the years of school, the most interesting objects and the simplest phases coming up for study at first, the harder object coming later and the method developing into complete experiment. (See first three principles of instruction.) In order to systematize object lessons, the schools should offer courses in Form, Color, Parts, Qualities, Facts, etc.

#### I. FORM.

Three things deserve our present attention: (1) Embodiments of Forms; (2) The Method of Teaching Forms; and (3) The Importance of Teaching Forms.

**The Embodiment of Forms.** The objects of the child's environment are embodiments of elementary forms into which (see chapter on Drawing) these objects can be analyzed. Every school-room should be supplied with a box of geometrical forms and such objects as resemble these forms. If the teacher cannot construct the geometrical forms, he can probably induce his directors to pay for the necessary supply. The Milton Bradley Company, Springfield, Massachusetts, is ready to supply all the special materials for object lessons. Supple-

mentary objects should be collected by the pupils under the teacher's supervision.

*Elementary Forms.* The following catalogue of forms will serve as an outline of the course of lessons on Form. Pupils should know these forms at the age of fourteen.

Elements of Form.	Lines.	Angles.	Polygons.
1. Lines.	1. Straight.	1. Right.	1. Triangles.
2. Angles.	2. Curved.	2. Acute.	2. Quadrilaterals.
3. Surfaces.	3. Broken.	3. Obtuse.	3. Pentagons.
4. Volumes.	4. Parallel.		4. Hexagons.
	5. Oblique.		5. Heptagons.
			6. Octagons.
			7. Nonagons.
			8. Decagons.
Triangles.	Quadrilaterals.	Circle.	Circular Forms.
1. Angles.	1. Parallelograms.	1. Circumference.	1. Oval.
(1) Right.	(1) Square.	2. Diameter.	2. Ellipse.
(2) Obtuse.	(2) Rectangle.	3. Radius.	3. Ring.
(3) Acute.	(3) Rhombus.	4. Arc.	4. Crescent.
2. Sides.	(4) Rhomboid.	5. Chord.	
(1) Equilateral.	2. Trapezoid.	6. Segment.	
(2) Isosceles.	3. Trapezium.	7. Sector.	
(3) Scalene.		8. Tangent.	
		9. Secant.	
		10. Quadrant.	
		11. Semi-circle.	
		12. Semi-circumference.	
Polyhedrons.	Round Bodies.		Conic Sections.
1. Prism.	1. Cylinder.		1. Ellipse.
(1) Cube.	2. Cone.		2. Parabola.
(2) Parallelopipedon.	3. Frustum of Cone.		3. Hyperbola.
(3) Triangular prism, etc.	4. Sphere.		
2. Pyramid.	5. Hemisphere.		Complex Forms.
3. Frustum of Pyramid.	6. Ovoid.		1. Catenary.
4. Plinth.	7. Ellipsoid.		2. Spirals.
	8. Circular Plinth.		3. Cycloid.

**The Method of Teaching Forms.** (1) The first thing to do in teaching a *form*, is to require the pupil to *observe* it. It is not enough to show the pupil *one* example; others must be added to stimulate comparison, thus prompting abstraction and conception. (2) Since the *names* of forms cannot be discovered by the pupil's unaided effort, these must be given by

the teacher, but always in strictest association with the form itself. (3) The teacher should draw the form in question or construct it, and require the pupils to do so. This requirement will be an incentive to close observation, and a preparation for the pupil's inductive description, or definition, of the form under consideration. (4) The pupil should be required to *define*, i.e., to describe the form observed, named, pictured, and made. This requirement will stimulate the closest attention, and develop the power to express actual knowledge. (5) The pupil should be encouraged to discover as many occurrences of the studied form as can be found in his environment. This requirement will make the pupil a deductive thinker, and lead him to use his knowledge of form in the interpretation of his surroundings. (6) The teacher should lead the pupils to see why *one* form rather than others is used in practical life. This will make the pupil a thinker, and teach him to help himself in many practical difficulties. The *æsthetic* powers of forms should also be taught.

**Importance of Teaching Forms.** (1) The study of forms (see chapter on Drawing) is a most excellent discipline. (2) A knowledge of forms is essential in the interpretation of the physical universe. (3) The culture and knowledge obtained in the study of forms is an essential equipment in the study of geometry, in art, and in many practical affairs.

## II. COLOR.

### a. *The Nature of Color.*

In order to understand the nature of color, it is necessary to study (1) The Solar Spectrum, (2) Synthesis of Colors, (3) Analysis of Compounds, (4) Complements, (5) Harmonies, and (6) Broken Colors. The Young-Helmholtz theory (see Natural Philosophy) is quite generally accepted by the scientists of the present time. A very convenient statement of this theory and its applications to education is to be found in "Color

in the Schoolroom," by the Milton Bradley Company, Springfield, Massachusetts. This little book should be in the hands of every teacher.

**The Solar Spectrum.** "According to this theory all color in Nature is contained in sunlight, which is practically white light. When a beam of sunlight, admitted into a darkened room, passes through a glass prism it is spread out like a fan into a band of beautiful colors, beginning at one end with a dark red, gradually changing to a brighter red, which runs into an orange and then through yellow, green, and blue to violet, which gradually fades away into darkness." This band of colors is termed the *Solar Spectrum*. "The beam of sunlight is composed of a great number of different kinds of rays, which in passing through the prism are refracted or bent from their direct course, and some are bent more than others; the red least of all, and the violet most. It is supposed that light is propagated by waves or undulations, in an extremely rare substance termed ether, which is supposed to occupy all space and transparent bodies. These waves are thought to be similar to sound waves in the air, or the ripples on the smooth surface of a pond when a pebble is thrown into it."

**Standard Colors.** "The standards must, of course, be chosen from the solar spectrum. The amount that rays of light are refracted from a straight line in passing through a prism is in proportion to the number of waves or undulations per second, and in inverse proportion to the length of the waves. The red waves are refracted the least and are the longest, while the violet rays are refracted the most and are the shortest." The following wave-lengths are assumed as standard colors: 6600, Red; 6100, Orange; 5800, Yellow; 5200, Green; 4700, Blue; 4200, Violet. (The figures represent ten millionths of a millimetre.)

**Scales of Color.** (1) "Any pure or full color mixed with white, or reduced by strong light," is termed a *Tint*. (2) "A

full color in shade, *i.e.*, with a low degree of illumination," is termed a *Shade*. (3) "A *Scale* is a series of colors consisting of a pure or full color at the centre and graduated by a succession of steps to a light *tint* on one side and a deep *shade* on the other." (4) "A color mixed with a smaller quantity of another color is called a *Hue*." Thus a scale of color is any spectrum transition from tint through hue into shade. (5) Accordingly there may be as many *Scales of Color* as there are hues or standards or tones in the spectrum.

**Synthesis of Colors.** "If having a prismatic spectrum thrown on a screen in a dark room we hold two small mirrors in the path of the light, one so placed as to receive, for example, the red rays and the other the violet rays, the mirrors may be so moved as to reflect the red and the violet rays on one spot on another screen. The result of this arrangement will be a mingling of the two colors to produce a color between the violet and the red usually called purple. And so we may select any other two colors and thus determine what color is produced by the mingling of any two or more spectrum colors. But it is very inconvenient to make such tests, even with the best apparatus and most favorable conditions." It is possible, however, to produce practically the same effects by means of the *Color Wheel* and the *Maxwell Disks*. (See the Bradley books.) If graduated disks are used, the exact proportions entering into composition may be observed and recorded.

**Analysis of Compounds.** The colors found in Nature and Art are generally composite colors, as in leaves, flowers, ribbons, etc. By *combining* and *adjusting* graduated Maxwell disks, it is possible to *imitate* the color of leaves, ribbons, etc., and thus to ascertain the exact analysis of such color-compounds.

**Complements.** "As white light is the sum of all color, if we take from white light a given color, the remaining color is the *Complement* of the given color. When the eye has been

fatigued by looking intently for a few seconds at a red spot on a white wall and is then slightly turned to the wall, a faint tint of a bluish green is seen, and this is called the accidental color of the red, which is supposed to be identical with its complementary color. Theoretically the complementary of yellow is a very slight violet blue, and of blue an orange yellow. The complementary of green is violet red and of violet a yellow green or green yellow. The complementary of red is blue green, and of orange a green blue.

**Harmonies.** "Two colors are said to be in harmony or to combine harmoniously if the effect is pleasing when they are in juxtaposition or are used in composition. There are about five species of color harmony. *Complementary* colors are harmonious; for the other species the student is referred to the Bradley system.

**Broken Colors.** "In addition to the spectrum standards and intermediate hues and their tints and shades, there is another class of colors which in general terms may be called *Broken Colors*. A broken color, as a broken red for example, is a standard red mixed with neutral gray, that is with black and white. In still other words, a broken color is a *tint* of that color in shadow. In Nature nearly all colors are broken." The same thing may be said of tapestries, hangings, carpets, ladies' dress goods, etc. "Eern," for example, is a broken orange yellow, whose proportions in terms of 100 are *orange* 12, *yellow* 15, *white* 17, and *black* 56.

#### b. *Instruction in Color.*

Three things deserve the attention of teachers of color: (1) Course of Lessons; (2) The Method of Instruction; and (3) The Importance of Color-Lessons.

**Course of Lessons.** To satisfy the demands of culture and life, the course of color-lessons should embrace the following subjects: (1) The Solar Spectrum; (2) Standard Colors;

(3) Matching Colors; (4) Mixing Colors; (5) Analysis of Colors; (6) Discovery of Complementary Colors; (7) Harmonies of Color; (8) Broken Colors; (9) Language of Colors; and (10) Tests for Color-Blindness.

**The Method of Instruction in Color-Lessons.** The nature of the task in color-lessons makes it necessary for teachers to consider (1) Preparations for Color-Lessons, and (2) The Recitation-Method in Color-Lessons.

*Preparations for Color-Lessons.* (1) The necessary *materials* for a color-lesson must be procured. This task devolves in part upon the teacher and in part upon the pupils. Every school-room in which color-lessons are to be taught should, if possible, be supplied with prisms, charts, color-wheel and the Maxwell disks, color-tops and the Maxwell disks, colored crayons, water colors, colored papers that do not contain arsenic. Silks, worsteds, etc., should be added. Pupils should be encouraged to collect colored leaves, worsteds, etc. When the time for recitation has come, the necessary materials should be on hand and in working order.

(2) It will be necessary for the *teacher* to make many experiments with the prism, color-wheel, etc., to be sure that he can make the desired points in the coming recitations.

(3) The *pupils* should be required to make such preparations as the nature of the case may demand. As a rule only older pupils can be expected to make formal preparations for color-lessons.

*The Recitation-Method in Color-Lessons.* (1) All color-lessons should begin with *Observation*. The observations necessary in color-lessons must often amount to experiment.

(2) *Induction* should follow observation. The possibility of ascertaining general truths is, indeed, the great reason for observing colors in these lessons. When, for example, the pupils have observed the spectrum many times, they should be led to inquire whether the same results can *always* be ex-

pected. The habit of looking for that which will always happen in mixing colors, in complements, in harmonies, etc., should be early developed.

(3) *Deduction* should follow induction. When the pupil has found some general truth, he should be led to make it a life-rule. It is thus that science becomes art.

(4) All the technical terms needed in color-lessons should be introduced in strict association with that which they signify. Language lessons should follow.

(5) The teacher should strive to make color-lessons as interesting and useful as possible, thus enlisting the heart, the imagination, and the will.

(6) For special directions in lessons on complementary colors, harmony of colors, language of colors, and for methods of testing children for color-blindness, see "Color in the School-Room," or Calkin's "Manual of Object Teaching."

**Importance of Color-Lessons.** To appreciate the importance of lessons on color, the reader must understand their efficiency as a means in culture and instruction.

(1) There is a general agreement among educators that color-lessons when properly given utilize and improve all the functions of the mind. (Let the Methods-Student show this truth in detail.)

(2) The knowledge of color is interesting for its own sake and a means in the æsthetic and practical interpretation of the universe.

(3) The culture and knowledge acquired in color-lessons serve many of the ends of life, and cannot be omitted in our times without serious disadvantage to millions of people.

(4) All teachers should, therefore, be able to give such lessons. The evidence of such ability should be as much in demand by those who license and employ teachers as the evidence of ability in the other branches of our curriculum. Normal schools should offer the most thorough course in colors



and the method of teaching colors. The task of thus equipping teachers must fall partly on the department of natural philosophy and manual training and partly on that of pedagogy. The most remarkable progress along these lines is visible everywhere, and the prospects are decidedly encouraging.

### III. PARTS OF OBJECTS.

Three things deserve our attention in lessons on the *parts* of objects: (1) The Course of Lessons; (2) The Method of Instruction; and (3) The Importance of Lessons on the Parts of Objects.

**The Course of Lessons.** The following catalogue of objects and their parts will serve as an illustrative outline of the work to be done and the domains of Nature and Art from which to choose the objects to be studied:

- |                     |               |                |                  |
|---------------------|---------------|----------------|------------------|
| 1. Cent.            | 2. Scissors.  | 3. Key.        | 4. Lead Pencil.  |
| (1) Surface.        | (1) Shaft.    | (1) Shaft.     | (1) Wood.        |
| (2) Faces.          | (2) Bows.     | (2) Ring.      | (2) Lead.        |
| (3) Edges.          | (3) Limbs.    | (3) Barrel.    | (3) Head.        |
| (4) Milling.        | (4) Blades.   | (4) Lip.       | (4) Point.       |
| (5) Impression.     | (5) Edges.    | (5) Wards.     | (5) Number.      |
| (6) Image.          | (6) Back.     | (6) Grooves.   | (6) Trade Mark.  |
| (7) Superscription. | (7) Point.    |                |                  |
| (8) Date.           | (8) Rivets.   |                |                  |
| 5. Bell.            | 6. Shoe.      | 7. Chair.      | 8. Knife.        |
| (1) Handle.         | (1) Upper.    | (1) Posts.     | (1) Handle.      |
| 1) Nut.             | (2) Binding.  | (2) Rounds.    | 1) Frame.        |
| 2) Catch.           | (3) Seams.    | (3) Back.      | 2) Rivets.       |
| 3) Shaft.           | (4) Lining.   | (4) Seat.      | 3) Heel.         |
| 4) Ferule.          | (5) Strings.  | (5) Pillars.   | 4) Back.         |
| 5) Number.          | (6) Buttons.  | (6) Spindles.  | 5) Spring.       |
| (2) Cup.            | (7) Eyelets.  | (7) Slats.     | 6) Sides.        |
| 1) Border.          | (8) Vamps.    | (8) Balls.     | 7) Plate.        |
| 2) Rim.             | (9) Welt.     | (9) Beads.     | 8) Grooves.      |
| 3) Edge.            | (10) Shank.   | (10) Scallops. | (2) Joint.       |
| (3) Tongue.         | (11) Counter. | (11) Brace.    | 1) Pivot.        |
| 1) Loop.            | (12) Tongue.  |                | (3) Blade.       |
| 2) Clapper.         | (13) Sole.    |                | 1) Sides.        |
|                     | (14) Insole.  |                | 2) Notch.        |
|                     | (15) Tip.     |                | 3) Back.         |
|                     | (16) Heel.    |                | 4) Edge.         |
|                     |               |                | 5) Point.        |
|                     |               |                | 6) Maker's Name. |

Wheel.	10. Column.	11. Shell.	12. Flower.
(1) Nave.	(1) Entablature.	(1) Body.	(1) Calyx.
(2) Box.	1) Cornice.	1) Mouth.	1) Sepals.
(3) Spokes.	2) Frieze.	2) Lip.	(2) Corolla.
(4) Arm of Axletree.	3) Architrave.	3) Beak.	1) Petals.
(5) Linchpin.	(2) Shaft.	4) Canal.	a. Limb.
(6) Rim.	1) Capital.	(2) Spire.	b. Claw.
1) Felloes.	2) Base.	1) Whorls.	(3) Pistils.
(7) Tire.	(3) Pedestal.	2) Sutures.	1) Stigma.
(8) Rivets.	1) Cornice.	3) Apex.	2) Style.
(9) Centre.	2) Dado.		3) Ovary.
(10) Circumference.	3) Plinth.		(4) Stamen.
			1) Anther.
			2) Filament.
			3) Pollen.
13. Orange.	14. Acorn.	15. Insect.	16. Bird.
(1) Peel.	(1) Cup.	(1) Head.	(1) Head.
1) Rind.	1) Stem.	1) Mouth.	1) Beak.
2) White.	2) Scales.	2) Eyes.	2) Tongue.
(2) Juice.	3) Edges.	3) Feelers.	3) Eyes.
(3) Pulp.	(2) Nut.	(2) Thorax.	(2) Neck.
(4) Seeds.	1) Shell.	1) Wings.	1) Nape.
(5) Eye.	2) Kernel.	2) Legs.	(3) Body.
(6) Divisions.	3) Point.	(3) Abdomen.	1) Wings.
(7) Membrane.	4) Scar.	1) Segments.	2) Limbs.
	5) Membrane.		(4) Tail.

**The Method of Lessons on Object-Parts.** The objects in question should be observed *analytically*. The *names* of the parts studied should be introduced in the closest connection with the observation of the parts. The pupil should be led to inquire into the *uses* and *history* of the parts of objects in their surroundings. "The Young Folks' Cyclopædia of Common Things," published by Henry Holt & Co., is a most excellent reference book for teachers. Sheldon's "Object Lessons," published by Scribner, Armstrong & Co., should be in the hands of every teacher.

**Importance of Lessons on Object-Parts.** (1) There is probably no better means of cultivating the habit of *analytic* observation and *practical* thoughtfulness than these lessons on the parts of objects. These lessons also develop the habit of associating *words* and *sentences* with the realities for which they stand. This is an ideal result.

(2) Analytic knowledge of objects is a great satisfaction to most minds, and a mighty stimulus in the formation of the habit of scientific inquiry.

(3) The habit of analytic observation and the knowledge thus acquired, are among the best equipments in theoretical and practical life. Apart from such equipment, theory is often fancy and practice full of blunders.

#### IV. QUALITIES OF OBJECTS.

Lessons on the qualities of objects should be added to those on form, color, and parts. It is probably most convenient to teach qualities in connection with parts and uses. Three things deserve our attention at this point: (1) The Course of Lessons; (2) The Method of Instruction; and (3) The Importance of Lessons on Qualities.

**The Course of Lessons.** The following catalogue of qualities will serve as an outline of the course:

Extension.	Resistance.		Sight.	Taste.
Round.	Hard.	Pliable.	Transparent.	Edible.
Square.	Soft.	Elastic.	Translucent.	Pungent.
Angular.	Rough.	Ductile.	Opaque.	Sapid.
Triangular.	Smooth.	Malleable.	Brilliant.	Nutritious.
Rectangular.	Stiff.	Buoyant.		Tasteless.
Cylindrical.	Limber.	Compressible.	Smell.	Emollient.
Spherical.	Light.	Pulverable.	Odorous.	Salient.
Concave.	Heavy.	Fusible.	Aromatic.	etc.
Spiral.	Solid.	Volatile.	Saline.	
Serrated.	Liquid.	Inflammable.		
Amorphous.	Brittle.	Combustible.		
	Flexible.	Soluble.		
	Adhesive.	Insoluble.		
	Tenacious.			

**The Method of Lessons on Qualities.** Qualities should generally be studied in connection with parts and uses. The pupil should be led to experience the qualities which the teacher wishes to teach. The name should then be introduced. The pupils should also be led to think to what *uses*

objects having such qualities can be put just *because* they have these qualities. Sheldon's "Lessons on Objects" is the teacher's indispensable companion.

**Importance of Lessons on Qualities.** The study of qualities is the study of the forces of the physical universe, and is probably the most practical mental employment.

## V. NATURE STUDIES.

The informal study of plants, animals, minerals, etc., just as we come upon them in Nature, is termed *Nature Study*. Such lessons will be the only opportunity of many pupils to gain an insight into our great and wonderful world. Three things deserve our attention: (1) The Course of Studies; (2) The Method of Instruction; and (3) The Importance of Nature Studies.

**The Course of Nature Studies.** The course of lessons in nature studies must be left in great part to the teacher, his selection of studies depending upon his surroundings. Nevertheless teachers of nature studies should select subjects as much as possible within some system. To succeed in this attempt teachers need a training in the natural sciences.

*Botany.* The habit of observing plants should be cultivated in the pupils of our schools. The teacher should strive to rouse great interest in these observations, leading the children to think for themselves, and to come into close touch with Nature. Our pupils should know the names of the common plants, flowers, trees, etc., in their neighborhood, in connection with some of the most interesting and useful facts pertaining to such plants. Miss Youmans' "First Book of Botany," published by Appleton & Co., is a very excellent companion for the teacher in this work.

*Zoölogy.* The habit of observing the insects, birds, mammals, etc., in the neighborhood, should be developed in our

pupils. The teacher should strive to rouse great interest in these studies, leading the pupils to think for themselves and to come into touch with the heart of Nature. Our pupils should know the names of common animals, their homes, together with some of their habits, uses, etc. "Natural History Object Lessons," published by Heath & Co., is a convenient companion for teachers.

*Note.* Courses similar to those just suggested for plants and animals, should be planned in mineralogy, physiology, etc. But, although in the teacher's mind there should be some system of selecting subjects of study, great care must be taken to keep the lessons from becoming stiff and formal.

**The Lesson-Method of Nature Studies.** The most opportune time of the day should be devoted to the study of some interesting plant, insect, etc., found by the pupils or the teacher. These lessons need not come every day, nor at the same hour, and should never be longer than ten or fifteen minutes. The greatest freedom of inquiry should be allowed to pupils, and the teacher should meet these inquiries with such help as seems best. The pupils should be encouraged to find out as much as possible by their own efforts. The teacher must supervise inquiry by means of skilful questions. The teacher should be prepared to lead the pupils without seeming to do so formally.

**The Importance of Nature Studies.** In our days very great stress is laid on "nature study." Educators insist on it, that nature study is an invaluable means of culture and a necessary preparation for the understanding and appreciation of literature, etc.

*The Culture-Value of Nature Studies.* In these informal inquiries into the phenomena of Nature as it presents itself to experience, the first aim is to discover facts. But inquiry does not end with the ascertainment of facts; the pupil is stimulated to form opinions. Thus it appears that the per-

ceptive and reflective faculties come into service, but they come into service in such a way as to require the most faithful employment of memory, imagination, taste, and will.

*The Instruction Value of Nature Studies.* The knowledge acquired in nature studies is charmingly interesting in itself—a veritable revelation of mysteries—a glimpse into the great thoughts of God, of which objects are simply the embodiment. Moreover, the ideas and facts thus gathered are the proper data for later scientific conclusions.

*The Practical Value of Nature Studies.* The habit of observing plants, animals, stones, etc., together with the knowledge thus acquired, will help to fit our pupils for various industries, such as farming, gardening, care of animals, etc. The practical results of nature study are alone worth the time they require.

**The Method of Object Lessons.** The distinctive feature of object lessons is the requirement that all inquiry must begin with sensible observation. This requirement makes it necessary to procure a suitable supply of materials, with which the teacher must become thoroughly familiar. The recitation should generally be conducted according to some definite plan thought out by the teacher in preparing for the recitation. Generally no formal preparation is to be required on the part of pupils. For details see the method of lessons on form, color, parts, qualities, and nature studies.

**The Importance of Object Lessons.** The importance of object lessons is generally admitted to be very great. (1) As pointed out under form, color, parts, qualities, and nature studies, object lessons, although designed primarily for the cultivation of the senses, in connection with memory, judgment, and attention, really call the whole pupil into service. (2) Then, too, the knowledge acquired in object lessons is “first hand,” and therefore warm with interest for learners. Such knowledge becomes the mightiest incentive to subsequent scien-

tific research. (3) The practical results reach into every department of mental culture and into almost every department of practical life. (4) The ability of teachers to teach object lessons effectively should be developed in all schools preparing teachers.

## CHAPTER III.

## READING.

THE pedagogics of reading is concerned with two problems (1) The Nature of Reading ; and (2) Instruction in Reading.

## A. THE NATURE OF READING.

It serves our present purpose to study the nature of reading under three heads : (1) The "Subject" of Reading ; (2) The Psychology of Reading ; and (3) The History of Reading.

## I. THE SUBJECT OF READING.

The logical phases of reading are pronunciation, comprehension, and expression.

**Pronunciation.** Reading presupposes visible records of thought and sentiment. Reading consists of interpreting these records and expressing their content. It is necessary, therefore, to know the mental value of words and to acquire the power to *pronounce* words. The mental value of words is learned in the process of learning to pronounce. It is evident (First Principle of Instruction) that pronunciation begins with imitation and ends in synthesis. Analysis intervenes when pronunciation begins with whole words. Pronunciation, *i.e.*, the complete utterance of a word-whole, implies enunciation, articulation, and accentuation. The distinct utterance of the sounds of a word is termed *Enunciation*. The utterance of a word-whole, as "control," is somewhat interrupted by oral rests, or pauses. The resulting parts of words are termed *Syllables*. The synthesis of syllables into word-wholes is termed *Articulation*. Vocal stress on syllables is termed *Accent*.



**Laws of Pronunciation.** The tendencies in pronunciation are probably phonetic laws, though arbitrary usage has introduced many exceptions into the English language.

*Laws of Enunciation.* (1) Vowels are generally short in two or three letter words, except such as end with *r*; before two or more consonants the first of which is not *r*; and in unaccented syllables, except when followed by *w* or *r*. (2) When a vowel is separated by a single consonant from final *e*, that vowel is generally long, and the *e* silent. When two vowels, not proper diphthongs, come together, the former is generally long, and the latter silent. (3) When it follows *w* and is not followed by *r*, *a* is generally equivalent to short *o*. (4) When *r* separates *a* from final *e*, *a* is circumflexed, and *e*, silent; as, hare. *A* is also circumflexed before *ir*, and the *i*, silent. (5) Before *r*, and *r* with another consonant, *a* is generally Italian; as, car, barn. Such words as war, carry, and parallel, are exceptions. (6) *A* is short Italian before *ss*, *sk*, *sp*, *st*, *ff*, *ft*, *nt*, and *ne*, except when *w* precedes *a*. (7) *A* is broad before *w*, *ll*, *lk*, *ld*, *lt*, *ub*, *ul*, and *ught*, and when *w* precedes *ar*. (8) Before *ign* and *igh*, *e* is generally equivalent to long *a*. (9) *E* is generally waved before *r*; as, her. (10) When the liquids are followed by *en* final in an unaccented syllable, *e* is short; but when it follows *d*, *k*, *p*, *s*, *t*, *v*, *x*, *sh*, and *th*, *e* is generally silent. (11) When *el* final follows *b*, *c*, *d*, *n*, *ss*, *p*, and *u* or *ew* long, *e* is generally short. (12) When *il* or *in* final is found in an unaccented syllable, *i* is generally short. (13) After *w* and before *k*, *oo* is generally short; as, wood, took. When *w* does not precede or *r* follow, *oo* is generally long; as, mood, soothe. (14) *O* is generally circumflexed before *r*, and *ught*; as, for, thought. (15) *O* is generally silent in final *or* without an accent after *c*, *ck*, *s*, or *t*. (16) When *r*, *sh*, and *y*, separate *u* from final *e*, *u* is equivalent to *oo*, and *e* is silent. (17) *U* is generally equivalent to consonantal *w* in words and syllables beginning with *qu*; in dissyllables and trisyllables where *ui*

or *ue* follows *q*; in words beginning with *cu* followed by *i*; and in unaccented syllables beginning with *g* where *u* is followed by *a*, *i*, or *o*. (16) Obscure vowels occur only in unaccented syllables. (17) *C* and *g* are generally soft before *e*, *i*, and *y*; and hard before *a*, *o*, *u*, *k*, *l*, *r*, and *t*. (18) *H* is generally silent after *g* and *r*; after a vowel in the same syllable; and before some vowels. (19) *L* is generally silent between *a* and *f*, *a* and *k*, *a* and *m*, *a* and *v*. (20) *N* is generally equivalent to *ng* hard before *k* and *q*, and before *c*, *g*, and *x* hard. (21) *S* is generally hard after vowels, and all consonants except *f*, *k*, *p*, and *t*. In *sion* and *sure*, it is soft after all consonants. (22) *T* is generally silent before *ch*; also, after *s* in dissyllables ending in *en* and *le*. (23) *Th* is breathed before *r*, *ir*, and some vowels; also as final consonants, except in verbs and generally in plural nouns. (24) *Th* is generally voiced as first letters of personal, relative, and demonstrative pronouns, and adverbs; in plurals of words ending in *th*; in verbs ending in *th* and *the*; and in the preposition *with* or its derivatives. (25) Before any vowel except *o*, *wh* is generally equivalent to *hw*. (26) *W* is generally silent in words and syllables beginning with *wr*; after *a*, and in the improper diphthong *ow*. (27) *X* is generally hard before an accented syllable beginning with a vowel, or silent *h*, but soft before syllables beginning with a consonant. (28) There are many less important rules of enunciation and articulation; but space does not permit us to record them here. Teachers should study the principles of pronunciation more fully in Worcester's Unabridged Dictionary, or in some good book on Orthoepy.

*Laws of Articulation.* (1) The natural rests of the vocal organs in pronunciation generally determine the syllables, as in observation. (2) Prefixes and suffixes generally constitute new syllables, as in improper, contentment, expulsion. (3) In articulation the etymological composition of a word is generally less attended to than ease of utterance, though the

two tendencies often result in the same spelling; as, component, etymological.

*Laws of Accentuation.* (1) Derivative words take for a time, if not permanently, the accent of the original words from which they are formed; as, contentment, comprehend. (2) Ease of utterance has some influence in deciding the place of the accent; as, utensil, excellent. (3) In words of two syllables there is a tendency to accent the first syllable of a noun, and the last of a verb; as, convert, accent, record. (4) In words of three or more syllables there is a strong tendency to accent the antepenult; as, contemplate, eloquent, intricate. (5) These tendencies of accent have many exceptions by conflict with each other. The student should refer to Worcester's Unabridged Dictionary for a full discussion.

**Comprehension.** Comprehension in reading, *i.e.*, getting the thought and sentiment, begins in the process of associating written with spoken words; it ends in the sentential association of words. That which is orally read, but without thinking, is only pronunciation. Intelligible reading is impossible, as we shall see, for one who does not understand and feel what he reads.

**Expression.** "Expression" in reading denotes the effective conveyance of thought and sentiment by adaptations in pronunciation, by facial movements, and by gestures. The most important means of expression in reading, are those adaptations in pronunciation commonly termed fluency, time, pitch, force, quality of voice.

*Fluency.* The ability to recognize quickly and to pronounce readily the words as they are seen in reading, is termed Fluency. *Lisping* and *stammering* are two forms of violated fluency. (1) *Lisping* is an obstructed utterance of soft *s*, the sound given being flat *th*; as, thick for sick. (2) *Stammering* is an obstructed utterance of syllables. Sometimes it is impossible for one who stammers, to utter the intended syllable at

all, and sometimes he repeats the syllable involuntarily ; as, *st, st, stand*. The causes and remedies of lisping and stammering will be discussed by and by.

*Emphasis.* Any impressive way of uttering words or phrases in reading, is termed *Emphasis*. There are four species of emphasis ; namely, Stress, Pause, Inflection, and Time. (1) The extra force with which some word or phrase is uttered in reading, is termed *Stress*. Stress may be compound, intermittent, median, radical, or vanishing. (See Elocution.) (2) When, after uttering some word in a sentence, the reader stops, or allows an interval of time, before he proceeds, the emphasis is termed *Pause*. (3) Ascent and descent of pitch in the utterance of a word in reading, is termed *Inflection*. (4) Quick, ordinary, and slow utterance of a word in reading, is termed *Time*.

*The Laws of Emphasis.* (1) Words expressing new ideas are emphasized. (2) Words expressing important ideas are emphasized. (3) Words expressing contrasted ideas are emphasized.

*Movement.* Every variety of pace in reading a sentence, is termed *Movement*. It is the function of movement to express the reader's feelings.

*Pitch.* The degree of elevation of the voice in reading, is termed *Pitch*. Pitch is high, medium, low, monotonous, or varied. It is the function of pitch to express sentiments.

*Force.* Degree of stress in reading a sentence, is termed *Force*. Force is either loud or intense. The degrees of force are subdued, moderate, and loud. It is the function of force to aid the ear of the hearer, and to express strong feeling.

*Quality of Voice.* Tone of voice in reading is termed *Quality*. The qualities of voice are pure, aspirated, guttural, nasal, and orotund. It is the function of "quality of voice" to express the various feelings and shades of feelings in readers.

## II. THE PSYCHOLOGY OF READING.

In view of the "subject" of reading (see pages 106 to 110), we conclude that the mental acts in reading are those involved in pronunciation, comprehension, and expression.

**Pronunciation.** (1) The "facts" of pronunciation, whether they be the facts of imitation, analysis, or synthesis, are learned, as in other studies, by *observation*, *i.e.*, by the use of the judgment in connection with the senses. This connection implies attention, memory, and imagination.

(2) The "principles" (laws) of pronunciation, whether they be those of imitation, analysis, or synthesis, are learned, as in other studies, by *induction*.

(3) By deductive application of principles, pronunciation becomes practical skill.

**Comprehension.** (1) Which functions of the intellect must be employed in reading, depends on the contents of the page in question. (2) The emotional sequences (see the tenth law of mental activity) in reading, depend on the character of the intellectual activity. (3) The reader must use his will both in getting the mental contents of a page and, as we shall see, in expressing these contents.

**Expression.** (1) The "facts" of expression in reading, whether they be those of fluency, time, force, pitch, emphasis, or quality of voice, must be learned by *observation*. (2) The laws of expression, like other laws, are learned by induction, and (3) applied by deduction.

## III. HISTORY OF READING.

The history of reading is conveniently studied under two heads: (1) The History of Methods of Instruction; and (2) Reading in the Curriculum of Schools.

**History of Methods.** (See pages 121 to 124, and also Painter's History of Education.)

**Reading in Schools.** Reading was a subject of study in oriental countries. The classical nations began to lay great stress on reading. The darkness of the Middle Ages obscured the importance of the subject, but could not drive reading out of the schools. Reading has become the "great" study in all modern nations.

## B. INSTRUCTION IN READING.

The special features of instruction in reading come to view under the following heads: (1) The order of the teacher's tasks; (2) The methods of instruction; (3) The courses of instruction; and (4) The importance of reading.

**Order of the Teacher's Tasks.** In teaching reading, the tasks, as we know from the nature of the subject and the principles of instruction, are as follows: (1) Transition from oral to visible language, (2) The pupil's emancipation in pronunciation; (3) Fluency in expression; and (4) Adequate mental development.

**The Method of Instruction.** In reading, as in other branches, the pupil should be required to observe individuals of a genus, infer the genus by analogy, and assume the genus in subsequent study. (Tenth Principle of Instruction in connection with the psychology of reading.) Accordingly, the vocabulary and sentences of elementary reading should be representatives of genera. In pronunciation, for example, representative words must be found by the teacher and carefully taught. With these representative words, many analogous words must be associated, until the pupil arrives at the rule to be learned. In this way the inductive method will become a habit of the pupil, and his emancipation in pronunciation assured. In due time *new* words will come to the learner as individuals of some family or species with which he has already become acquainted. Thus induction finds its supplement in deduction, and only anomalies will trouble the

learner. Subsequent lessons should tend to develop accuracy and rapidity in deductive pronunciation. Of course, anomalies and complexities can be mastered only by special and persistent drills. Emphasis, movement, quality of voice, etc., can all be taught in the same way.

**An Ideal Vocabulary.** The following graded list of representative words is constructed to meet our requirements, and must be taught *in constant connection* with the laws of enunciation stated for teachers on pages 107 and 108. The diacritical marks used in the school *must always be added according to the laws of enunciation just noticed.*

*Short Vowels.* Hat, at, man, an, fat, ax, tack, hand, rang, sank, flash, mat, egg, peck, men, end, sent, kept, nest, left, dress, mesh, in, it, ink, splint, fist, with, kiss, sniff, of, on, ox, pond, moss, lost, up, rub, hunt, must, muff, hush.

*Long Vowels.* Bake, tape, late, male, name, wave, mine, pipe, time, file, sole, rope, lobe, fume, mule, flute.

*Proper Diphthongs.* Boil, toil, boy, toy, out, snout, brown, town.

*Doubled Consonants.* Muff, muffs, egg, eggs, bell, bells, hiss.

*Doubled Vowels.* Book, food, nook, root, soot.

*Improper Diphthongs.* Speak, break, ceiling, door, four, blow, day.

*Ambiguous Consonants.* City, cake, gem, gate, goat, give, cuffs, silks, desks, tips, rasps, nets, masts, tubs, buds, logs, oils, teams, runs, cars, fox, except, exact, Xerxes; cohesion, mansion, pleasure, tonsure; of, offer; fled, passed.

*Consonantal Digraphs.* Church, laugh, thin, this, chaise, shall, sing.

*Silent Consonants.* Comb, doubt; pledge; gnat; ghost, Rhone, Hannah, honest; stick, knot; calf, calm, halve, talk; kiln, hymn; prompt, psalm, pneumonia; watch, glisten, this-tle; wrap, crawl.

*Silent Consonantal Digraphs.* Yacht, light, bought.

*Equivalent Consonants.* Cat, kite, quick, stick, chrism ; sit, lace ; church, watch ; off, trough, pheasant ; joy, gill, soldier ; hallelujah, Julia, yes ; thank, song ; canon ; has, zeal ; social, nation, precious, chaise, shall ; sit, missed ; vane, of ; noxious ; flints, chintz.

*Intermediate Vowels.* Again, around ; pare, fair ; ask, dance ; tall, law, war ; bar, park ; emit, the ; her ; pique, field ; son, word, nation ; could, would ; your, tour ; one, once ; for, morn ; omit, lesson ; full, put ; rude, ruin ; quay, conquest.

*Equivalent Vowels.* Said, bet ; was, not ; warm, north ; dollar, father ; sere, spleen, sneak, field ; met, bury ; miss, been, business, women ; further, work ; her, fir, myrrh ; bite, fry, lye, high ; son, sun.

*Equivalent Vowel Digraphs.* Hay, paid, break, they, feign, freight ; bare, fair, where, their, wear ; oh, toe, float, four, blow, floor, sew ; moon, moves, crude, drew ; tune, few, juice, due.

**Progress in Vocabulary.** (1) At first, and for some months, the vocabulary of reading lessons should consist mostly of concrete monosyllables whose vowel is *short*, and the consonants simple ; as, hat, melt, pin, pond, rub. In the construction of sentences the teacher may introduce, though sparingly, necessary words that do not belong to this genus. These words must, of course, be taught arbitrarily. The endings *s* and *es* for plural nouns may be introduced. (2) Concrete monosyllables whose radical vowel is *long*, and *e* the final letter, should be taken up after considerable work has been done on short vowel monosyllables. Dissyllables, proper diphthongs and doubled vowels, as well as doubled consonants, may be introduced at this stage. The names of the letters and spelling become appropriate at this point. Print, charts, and books, should be employed after the first half year. The first and second courses should together take about one year. (3) Then lessons on improper diphthongs, ambiguous consonants, silent consonants, consonantal digraphs, silent consonantal di-



graphs, equivalent consonants, equivalent vowels and vowel digraphs, and intermediate vowels, should be gradually introduced. The teacher should not take up any new task until the pupil has arrived at the principle to be learned. If the pupil knows the principles of reading, especially those of pronunciation, by the time he has passed once through the fourth reader, the progress is amply sufficient. His emancipation from the teacher's supervision in that event will have been almost accomplished. (Eighth Principle of Instruction.)

### I. ELEMENTARY COURSE IN READING.

It is important to know just *what* to do in teaching, and *how* to do it, and the *reasons*. The following outline and exposition are therefore submitted to teachers of reading :

#### The First Year in Reading.

1. *A suitable oral vocabulary to be built.*
2. *Transition to visible words.*
3. *Audible and visible analysis of representative words.*  
*Requisite teaching ability.*
4. *Visible analysis and audible synthesis of analogous words.*
5. *Inductive discovery of rules of pronunciation, etc.*
6. *Words taught built into sentences as fast as practicable.*  
*The teacher's preparation, and record of lessons.*
7. *The function of diacritical marks, etc.*
8. *Script letters and the black-board, capital letters.*
9. *The alphabetic names.*

**Building a Suitable Vocabulary.** The mode of procedure in building an oral vocabulary is determined by the nature of the step. (Second Principle of Instruction.) At the age of six years, the child knows many objects, qualities, and actions, but may not know their *names* in English. In that event, the words to be taught must be taught as names of objects, qualities, and actions, just as mother does it, *i.e.*, by perceptive association. If, however, the English language is

the child's mother-tongue, the appropriate object, quality, or action, is to be named by him at the teacher's request. The object, quality, or action, need not be present to the child's senses, if the teacher knows how to resort to the child's memories and concepts. This is usually accomplished through pictures, gestures, questions, and other devices.

**Transition to Visible Words.** The transition from oral to visible words can be made as soon as the pupil has learned the oral word, though it is thought best to defer it for some weeks. In case of those children whose mother-tongue is English, the transition is appropriate as soon as the child comes to school. The mode of procedure is perceptive association. (Second Principle of Instruction.) In other words, the teacher gets the child to *speak* some name, and then *writes* it, thus presenting it to the pupil's eye. Objects and pictures add interest to the lesson, but are not essential to the transition.

**Audible and Visible Analysis of Representative Words.** In building the oral vocabulary of representative words, as well as in the transition to their visible forms, the pronunciation of the pupil is to be imitative. The reasons are as follows : (1) At this stage of childhood there is not a sufficient aptness of understanding to warrant deductive efforts so difficult as the deductive use of principles of pronunciation. (Third Principle of Education.) (2) At this stage of childhood there is sufficient imitative aptness and activity to do what is required. The requirement is therefore appropriate. (First Principle of Instruction.)

In due time, however, the pupil must be emancipated in pronunciation, *i.e.*, become able to pronounce new words unaided. But the pupil cannot pronounce a new visible word by himself until he acquires adequate ability in visible analysis and simultaneous audible synthesis. In other words, the pupil can pronounce any new word, as *confuse*, by himself,

as soon as he can decompose it into *con-fuse*, and [unite the sounds thus indicated into syllables, and these, if there be more than one, into the word-whole. The decomposing process is visible analysis; the uniting process, audible synthesis.

But visible analysis is impossible so long as the pupil does not know the elements of which the visible word, as *rose*, is composed. Therefore (Second Principle of Instruction) the analysis of *audible* words, simultaneous with visible analysis, must be taught until the pupil thoroughly knows all the visible representatives of the forty or more elementary sounds in the English language.

*Requisite Teaching Ability.* The teacher must, of course, know the true pronunciation of the words which he attempts to analyze. In other words, he must know the sounds of which a word is composed, the syllabication, and the accentuation. Moreover, he must know how to supervise and assist the vocalization of the pupil. It would not do, for example, to analyze the spoken word *is* as if it were spelled *iss*, or the word *voyage*, as if it were *woyage*. Indeed, the teacher needs a thorough course in Orthoepy and Elocution to accomplish artistic and satisfactory results in teaching reading. This training in Orthoepy and Elocution is imperative in selecting the analogous words to be associated with representatives of rules, and in supervising the pupil's arrival at the principles of pronunciation.

**Visible Analysis and Audible Synthesis of Analogous Words.** As fast as the pupil learns visible representatives of elementary sounds, there should be added visible analysis of *new* words that consist of these visible representatives. This visible analysis renders audible synthesis possible, and requires it as the necessary complement in independent pronunciation. Audible synthesis, as indicated by the visible analysis, must therefore always be associated with the visible analysis of new

words presented diacritically to the pupil's eye. When, for example, the new word *arose* is written on the blackboard, and then divided into *a-ro-se*, the child must be required to unite the sounds thus represented into syllables, and these, if there be more than one, into the word-whole. There should be abundant and long-continued practice in conjoining visible analysis and audible synthesis. Indeed, it should be continued for years as a means toward correct and pure articulation, etc.

**Inductive Discovery of Rules in Reading.** When the pupil can pronounce unaided a sufficient number of analogous words purposely associated in recitations, he must be made to see the law to which these words conform in pronunciation. The exceptions should be taught with special reference to the violated rule, and by special drill. The teacher should not attempt to teach many rules the first winter. Little by little the pupil will acquire the habit of looking for analogies and rules. After this inductive habit has come, the teacher's assistance will become less and less necessary. The principles of syllabication, accentuation, and elocution, are, of course, to be taught in the same way.

**Words Taught Built into Sentences.** The representative words used in reading lessons, and the analogous words, as well as the necessary arbitrary words, should be built into sentences. This should be done in all recitations and between recitations. Between recitations the sentences taught should be left on the black-board, and copied by the pupils. In due time the pupil should be urged to construct sentences of his own. This is what the child does with his oral vocabulary. It is as natural and interesting to a child to build words into sentences as it is to build play-houses. (Second Principle of Instruction.)

*The Teacher's Preparation and Record of Lessons.* The teacher should build the requisite representative words, and

analogous words as fast as necessary, as well as necessary arbitrary words, into a graded series of sentences. The utmost care and wisdom is needed in this task. Any teacher who cannot do this work well is in so far not qualified to teach. The sentences should be recorded, and used in preparing for recitations.

**The Function of Diacritical Marks.** If the English language were absolutely phonetic, *i.e.*, if each elementary sound had its own representative, or letter, and each letter its own phonetic value, the graphic contrivances termed "diacritical marks" would be superfluous. Inasmuch as the English language is not strictly a phonetic language, diacritical marks are indispensable in the analysis of visible words. Until the pupil arrives at the reflective stage of intellectual development, the diacritical marks, and perhaps also the accent marks, should be used by the teacher and the pupil. This is especially important at first. The symbols are to be gradually omitted by the teacher when he presents *old* words to the pupil's eye. In this case the pupil's associative memory is to be pressed into service, and with good reason; for pronunciation must eventually become mechanical, *i.e.*, the pupil must learn to read without the aid of diacritical marks, and without thinking of rules of pronunciation. But the symbols are to be employed with all *new* words, whether presented on the black-board, or found on charts and in elementary readers. In due time, however, the pupil must be taught to refer to the dictionary. In other words, all graphic contrivances should be omitted from fifth readers, perhaps from fourth readers, and the pupil should rely on the dictionary. (Eighth Principle of Instruction.)

**Script Letters and the Black-Board.** It is deemed best to employ script letters and the black-board for several months in reading lessons. (1) Writing takes less time, and is not so difficult for children. The printing that is necessary as an introduction to charts and books, is readily learned by associa-

tion. (2) The black-board is more interesting to the learner than charts and books, because it makes movements the object of attention. It is with the black-board that the teacher can best show children how to write letters, words, and sentences. Indeed, the pupil that watches his teacher write these letters and words day after day, and then imitates them between recitations, on the black-board, slate, or tablet, will learn to write without much additional instruction. (First Principle of Instruction.) Teachers should, of course, be good writers.

**Capital Letters.** Capital letters should be taught only as fast as needed, and by writing them side by side with the corresponding small letters, *i.e.*, by association. Very little explanation will be needed. (First Principle of Instruction.)

**The Alphabetic Names.** During the second half of the first year in reading, the *names* of the letters should be taught. Up to this time these names are of very little use, and might do much harm. As soon as ambiguous letters, *i.e.*, letters with more than one phonetic value, become frequent, their names are a convenience in speaking of them. When long words, silent letters, and other complexities, become frequent, oral spelling, and therefore the names of the letters, should be introduced as appropriate supplements. In due time, the names of the alphabetic letters should be taught in their order, both backward and forward. This acquisition will be a convenience in consulting dictionaries, references, cyclopædias, etc.

The only way to learn the alphabetic names is to associate the name of each letter with its form, and to persevere in this association until the committing is perfected. Only a few letters should be attempted at a time. It may be done in special recitations or in connection with exercises in reading.

**Between Recitations.** Visible analysis, including syllabication and accentuation, as well as sentence-building, should be required of pupils between recitations. Old words, or those

presented to the pupil at the close of a recitation, and after special drill, are suitable for these purposes. The requirement will impress recited lessons and pave the way for the next recitation. When, in due time, the elementary reader is put into the hands of the child, he should be required to write columns of words selected from his lesson according to special directions.

*Note.* The method described is appropriately termed the "Science Method," from the fact that its requirements are observation, induction, and deduction. It may also be called the "Psychological Method," from the fact that it is adapted to the natural requirements of the mind. (Tenth Principle of Instruction.) The distinctive features of the method are (1) the orthoepic choice of an oral vocabulary, and (2) the mode of discovering orthoepic and elocutionary principles. These features are in accordance with the principles of instruction, and constitute the special claims of the system.

**The Word Method.** The method of transition to visible words, is sometimes called the "Associative Method," from the nature of the process, and sometimes the "Word Method," from the fact that words rather than letters or sentences are first studied. Jacotot, a French philosopher and teacher (1770-1840), was among the first to use this method. The most prominent early advocate of the method in America was Professor Webb. For a time it was therefore called the *Webb* method. In England it is called the "Look and Say" method, or, the method of "Reading without Spelling." In itself the "Word Method" is insufficient. (1) It starts from nowhere in particular. (2) It develops no power in the pupil. (3) It aims at no definite results in orthoepy or elocution.

**The Alphabetic Method.** The old "Alphabetic Method" is so evidently absurd that it should be forever discarded. By this method it was required of the pupil to *name* the letters of a word, and then to try to pronounce the word. This was

simply impossible, because these names are not the elements of which the word is phonetically composed. By this method the child remained dependent too long on the teacher's supervision and assistance in pronunciation. The absurdity of the method comes home to adults when the letters of some Greek word are named, and the effort is made to pronounce the word. Thus, if the reader knows the names of the Greek word *λόγος* to be respectively Lambda, Omicron, Gamma, Omicron, and Sigma, he cannot even begin to pronounce the word; but if he knows the sounds of the letters to be respectively l o g-o s, he can pronounce the word at once.

**The Phonetic Method.** The "Phonetic Method" that was advocated some years ago, is impracticable, because it requires the pupil to know about fourteen new letters in addition to our twenty-six, in order to avoid the diacritical contrivances. The transition to twenty-six letters and the diacritical marks is necessary after all, and is complicated rather than promoted by the introductory phonetic system. If, however, the English language were absolutely phonetic, this system would have some real merit. It is not likely that the method will ever be revived.

**The Pollard Method.** The "Pollard Synthetic Method" consists of audible and visible synthesis. It *begins* with sounds, as *a* and *m*, prompting the pupil to find these sounds first in Nature and then to imitate them. It groups these sounds into "families," as *at*, *am*, *ack*, and "keys," as *b*, *f*, *l*, *t*. It employs a story called the "Johnny Story" to interest the learner. It resorts to analogies, association, and imagination, as when the child is required to imitate what the lamb, rooster, dog, etc., say. It *builds* words, *visible* words, pronounces them, and then *recognizes* these uttered words as names of objects, qualities, or actions. It aims from the beginning at the child's emancipation in pronunciation. It is called the "Pollard" method after Mrs. Pollard, the author.



The method claims the following merits : (1) "It gives certainty and independence in the recognition of words. (2) It gives rational scope and aim to diacritical marks. (3) It is a complete system of vocal training. (4) It promotes distinct enunciation and perfect articulation. (5) By its simple and effective rules, it secures proper pronunciation. (6) It equips pupils for an intelligent use of the dictionary. (7) It provides for the child those mental operations which are most agreeable to him. (8) It makes good spellers by its constant use of all the letters in a word." Leading educators of our own and other States affirm that experiments prove these claims to be well founded.

Several objections to the system deserve our attention. (1) The learner should be conducted from that which is known to that which is in logical junction with it. But the Pollard Method, beginning with "sounds" rather than with words, ignores the language acquisition of those children whose mother-tongue is the English language. Nevertheless, the Pollard Method overcomes the child's natural repugnance to abstractions by calling into service the child's imagination and his imitative powers. (2) Ideas precede names and signs. But the Pollard Method, reversing this order, builds words before it teaches their meaning. This violation is, however, effectively corrected by bringing the words thus built up into immediate connection with the ideas for which they stand. (3) The chief obstacle to the introduction of the Pollard Method is the fact that it requires trained teachers and special books, etc. In the long run this objection is convertible into a merit.

It is too early to predict the ultimate general adoption of the Pollard Method. It has been tried in hundreds of towns and cities, and, wherever the teachers understood their business, the results were satisfactory. Indeed, the system has won to its side many prominent educators who at first opposed it. Whatever may come of her system, Mrs. Pollard's books

are so suggestive and helpful that they should be in every teacher's library.

The method advocated in the text is designed to meet the requirements of fundamental principles, without the loss of the meritorious features of the methods considered.

## II. INTERMEDIATE COURSE IN READING.

A great deal of work in orthoepy and elementary elocution, remains to be done after the first year in reading. Presumably the child has now mastered the vocabulary of an ordinary first reader, and has acquired the inductive habit of discovering principles of orthoepy and elocution in a miniature way, and perhaps he has also acquired the supplementary habit of pronouncing deductively within a very limited vocabulary. It is evident, however, that these habits must be strengthened, and that the complexities of orthoepy and elocution should be gradually mastered until the pupil's emancipation in reading has been accomplished. This course should extend over the second and third year, probably over the fourth, and is appropriately termed the Intermediate Course, because it presupposes an Elementary Course, and requires a Higher Course as a supplement. The Intermediate Course may be outlined as follows:

### The Intermediate Course in Reading.

1. *Audible and visible analysis of complex representative words.*
2. *Visible analysis and audible synthesis of analogous words.*
3. *Inductive discovery of orthoepic and elocutionary principles.*
4. *Language lessons.*
5. *The attainment of fluency in elocution.*
6. *Special elocutionary exercises.*
  - Articulation.*
  - Lisping.*
  - Stammering.*

7. *The mental phase of reading.*

*Proper methods of work.*

*Lessons graded in vocabulary and contents.*

*Supplementary reading.*

*Development of literary habits.*

**Audible and Visible Analysis of Complex Representative Words.** There should be special drills on Improper Diphthongs, Ambiguous Consonants, Consonantal Digraphs, Silent Consonants, Equivalent Consonants, Intermediate Vowels, Equivalent Vowels, and Equivalent Vowel Digraphs. (See "Suitable Vocabulary.")

As in the case of words whose structure is simple, so in these complex words, there must be audible analysis simultaneous with visible analysis until the visible representatives become familiar representatives. The word *move*, for example, must be correctly pronounced, analyzed into its component sounds *m oo v*, written on the black-board correctly, and analyzed into the visible representatives *m o v e*. The teacher should call especial attention to the fact that *o* is equivalent to *oo*, and that *e* is silent.

**Visible Analysis and Audible Synthesis of Analogous Words.** The study of analogous words by visible analysis and simultaneous audible synthesis should follow the study of representative words by audible and simultaneous visible analysis. The words *reprove* and *improvement*, for example, should be studied by visible analysis and audible synthesis after the word *move* has been studied by audible and visible analysis.

**Inductive Discovery of Orthoepic and Elocutionary Principles.** Analogous words should be studied by conjoining visible analysis and audible synthesis until the orthoepic principle becomes evident. It is in this inductive way, for example, that the rule of *x* is to be discovered and stated as follows: *x* is generally hard before an accented syllable begin-

ning with a vowel or silent *h*, but soft before accented syllables beginning with a consonant; as, exact, exhort, exclaim. The principles of elocution are to be discovered in the same way. Great pains should be taken to develop these principles of reading into practical rules. The teacher should not allow his pupils to forget what they have learned. (Seventh and Eighth Principles of Instruction.) Exceptions to rules must be more carefully studied in drills adapted to the purpose.

**Language Lessons.** In the intermediate course of reading, pupils must be required to write columns of words selected from the lesson according to special directions, mark these words according to orthoepic rules, copy sentences, commit sentences, and construct original sentences. The usual requirements of language lessons are to be respected. The pupil, for example, should attend to capitals, commas, periods, spelling, penmanship, neatness, and system.

**The Attainment of Fluency in Elocution.** It is not the function of common schools to develop specialists in elocution. But that fluency which consists of correct and rapid articulation, rapid recognition and ready pronunciation, together with expressive skill in emphasis, movement, pitch, force, and quality of voice, are desirable attainments in any education. The pupils of our common schools should in due time and for various reasons attain to considerable ability in elocutionary fluency.

**Special Elocutionary Exercises.** The following special phonic drills will be found useful. The diacritical marks used with the "key" letters are those of the Worcester Dictionary.

*Enunciation Drills.* 1. *ă, ȃ, ȁ, ā, â, â, ä, â, a(ö), a(ë), a(ē);* at, cellar, acute, ape, dare, fast, far, war, was, again, quay.

2. *č, ē, c(ĭ), ē, e(ā), ê, ë;* rent, the, England, here, they, where, term.

3. *ı, î, ĭ, ĭ, i(y), ĭ;* pin, police, infinite, girl, onion, kite.

4. ђ, ђ, о(ѹ), ђ, ђ, ђ, о(ѹ), о(ѹ), ђ ; not, some, work, omit, roll, do, could, one, occur.

5. ѹ, ѹ, ѹ, u(ѹ), u(ѹ), ѹ, ѹ, ѹ ; up, upon, burn, bury, busy, push, truth, numerate, unite.

6. ѹ, ѹ, ѹ, ѹ ; myth, chrysanthemum, myrrh, cry.

7. ew(ѹ), ew(ѹ), ew(ѹ), oo(ѹ), ђђ, oo(ѹ), oo(ѹ), ѹѹ, ѹѹ, ѹѹ, ou(ѹ), ѹѹ, ow(ѹ) ; few, crew, sew, book, spool, floor, blood, oil, toy, proud, four, cow, flown.

8. ѹ, ѹ, ѹ, ѹ, ѹ, ѹ, ѹ, ѹ ; mate, paid, ray, break, whey, reign, eighth.

9. ѹ, ѹ, ѹ, ѹ, ѹ ; spare, stair, there, their, wear.

10. ѹ, ѹ ; a rat, the cat : a(ѹ), ѹ ; said, head : a(ѹ), ѹ ; was, on : ѹ, ѹ ; swarm, north.

11. ѹ, ѹ, ѹ, ѹ ; mete, screen, speak, fields : ѹ, u(ѹ) ; fret, bury ; ѹ, o(ѹ) ; fur, world : ѹ, ѹ, ѹ ; intersperse, firm, myrrh : ѹ, u(ѹ) ; fit, business.

12. ѹ, e(ѹ), o(ѹ), u, ѹ ; bin, been, women, busy : ѹ, ѹ, ѹ, ѹ ; ivy, spry, lye, fight : i(y), y ; spaniel, yell.

13. ѹ, a(ѹ) ; knot, what : ѹ, ѹ, ѹ, ѹ, ѹ, ѹ, ѹ, ѹ ; O, old, goat, toes, floor, four, blow, shew, oh.

14. ѹ, ѹ ; form, swarm : ѹ, ѹ ; sons, funnel : o(ѹ), ѹ ; one, ѹ : oo(ѹ), o(ѹ), ѹ ; spook, should, full : ђђ, ђ, ѹ, ew(ѹ) ; moon, prove, rule, strew : ѹѹ, ѹѹ ; loud, bowing : ѹѹ, ѹѹ ; foil, destroy.

15. ѹ, ѹ, ѹ, ew(ѹ) ; tube, dues, juices, few.

16. b, p, d, t, j, ġ, v, w, ch, j, ch, s, ş, x, ʃ, ʃ, k, ġ ; big, pick, dull, tin, jug, gill, voyage, winter, church, joke, choke, fits, sins, extort, exhort, example, kick, gold.

17. e, k, q, ck, ch ; call, kid, quote, quick, chrism : ʃ, s, z(ʃ) ; cement, soon, chintz : f, gh(f), ph(f) ; fins, laugh, sphinx : j, ġ, d(j) ; jug, gill, soldiers : i(y), j(y), y ; Indian, hallelujah, yonder : n(ng), ng ; think, strong : s, z ; is, zinc ; s(sh), t, c(sh), ch, sh ; sugar, faction, social, chaise, shine : f(v), v ; of, vows ; d(t), t ; decked, pit.

18. "He talks earnestly. On either side is the ocean. She sought shelter. The railroad ran directly across the rapid river. With a thick thimble Theresa Thornton thrusts thirty-three threads through the thick cloth."

19. Broths, truths, moths, triumphs, facts, asps, fifths, precincts, filched, gulped, depth, parts, harps, steps, girl, learn, nymph, phial, loiter, rhythm, mug, gaiter, wrist, dagger, stick.

20. The above exercises, and others selected from various sources, should be studied very carefully. The learner should speak very slowly at first, increasing his rate of utterance as he acquires ability.

*Lisping.* Lisping is due to several causes. Among others the following causes are common: (1) Association with some one who lisps; (2) Childish affectation; and (3) Defects of the organs of speech. The causes must be removed if possible. When it is impossible to remove the causes, as in organic defects, the pupil must be trained to manage his organs of speech with cultivated tact.

*Stammering.* Various causes lead to stammering. Among them are the following: (1) Exuberance of feeling; (2) Hurred utterance; and (3) Defects in the nervous system. If impulsiveness or heedlessness be the cause, the cure of these faults will be the cure of the stammering. If the trouble lies in the nervous system, hygienic attention may be the sufficient remedy. In all cases of stammering the pupil should be trained to self-control. In other words, he must learn to subordinate his impulses, and to overcome his nervousness. The practical rule must be: Speak slowly. Tact and kindness will do much in these unfortunate cases.

**The Mental Phase of Reading.** Reading in its ultimate sense presupposes and requires intelligence. The pupil must be taught to think and feel what he reads. In that event he becomes a treasury of wisdom, and an adept in expressing thoughts and feelings when he reads to others. The develop-

ment of intelligence in reading requires : (1) Proper Methods of Work ; (2) Lessons Graded in Vocabulary and Contents ; (3) Supplementary Reading ; and (4) The Development of Literary Habits.

*Proper Methods of Work.* (Seventh Principle of Instruction.) The teacher must insist on study. The pupil must know the pronunciation and meaning of the words in the lesson, must read the lesson until he can do it rapidly and correctly, and he must try to think and feel the lesson. In the recitation the teacher should ask many questions, thus stimulating previous study. He should also require the pupils to tell the story of the lesson, sometimes before and sometimes after the reading. He may even urge pupils to write the story of the lesson in their own words, before they come to recite.

*Lessons Graded in Vocabulary and Contents.* The lessons in reading, whether planned by the teacher, as in his introductory work, or found in readers, should be adapted to the stages of the pupil's mental development. (Third, Sixth, and Seventh Principles of Instruction.) The grading of lessons should therefore be perceptive, conceptive, and reflective. In other words, the vocabulary and contents of reading lessons should be mostly perceptive at first, then mostly conceptive, and finally also reflective.

*Supplementary Reading.* There should be supplementary readers in every school-room. At appropriate times it should be required of pupils to read *at sight*, or soon after sight, some paragraph or page that ranks in difficulty with that of his previous lessons. This requirement, being a variation from the usual text, will stimulate interest, and cultivate habits of reading. Books on geography, travels, biography, history, physiology, etc., may also be used as supplementary reading. (Fourth Principle of Instruction.)

*The Development of Literary Habits.* In due time the

pupils of our common schools should be urged to read such English classics as are suited to their age and progress. The teacher should strive to cultivate true ideals in literary habits. It is to be regretted that so few of our boys and girls acquire the habit of reading good books. In order to induce and establish this habit there should be a library of suitable books in every school. This library should, at least in part, be collected by the efforts of the pupils, as directed by the teacher, in order to cultivate appreciation for books and literary equipments. If possible, every school room should be supplied with a good periodical and newspaper.

### III. IMPORTANCE OF READING.

Reading, as everybody who thinks about it must see, is a most effective means of culture and instruction.

**Culture Value of Reading.** Reading is a stimulus to thought, and a help in the interpretation of the world in which we live. (See Rosenkranz.) It is through reading that we can think the thoughts of the "masters" after them, and that, through a train of corresponding feelings and purposes, we may live at least in part in their mental world. Thus it follows that reading becomes a mode of exercising the mind in all its possibilities.

**Instruction Value of Reading.** Reading is the key to a great deal of knowledge at which the mind without such means would not, and in many cases could not, arrive. The practical, æsthetic, moral, and religious importance of such knowledge, makes reading the subject *par excellence* in the acquisition of an education, and in the great commerce of ideas of the human race.

**Training of Teachers of Reading.** In order to do ideal work in teaching reading, the teacher must evidently be a good reader in its physical and mental phases. A pedagogical knowledge of reading is equally important to success.



## CHAPTER IV.

### WRITING.

THE pedagogics of writing is concerned with two topics: (1) The Nature of Writing; and (2) Instruction in Writing.

#### A. THE NATURE OF WRITING.

In order to arrive at a thorough understanding of the subject in hand it will obviously be necessary to study the following topics: (1) The Physical Act of Writing; (2) The Psychology of Writing; (3) The Structure of Script; (4) Properties of Writing; and (5) The History of Writing.

**The Physical Act of Writing.** The physical act of writing presupposes appropriate positions of the body, and consists of various movements of the fingers, hand, and arm. (1) There is some room for choice as to the position of the body in writing; we may assume the "front," "right," or "left" position at the desk. The sitting posture is generally preferred to the standing posture, the latter serving as a mode of relief. (2) The movements of the fingers, hand, and arm, are muscular movements of bone-levers on hinge-joints, wrist-joints, and ball-and-socket-joints.

**The Psychology of Writing.** The learner becomes acquainted with the positions, movements, and characters, by *observation*; he discovers the general truths of writing by *induction*, and reduces them to rules of practice by *deduction*. The most important feature of writing is the subjection of the physical organism to the mind. The various positions and movements in writing require very strict attention at first. In time these movements become habits, and require only a minimum of voluntary effort.

**The Structure of Script.** The characters, or letters, of writing are composite structures consisting of simple and complex lines.

*Species of Letters.* The script characters which are employed to represent the elementary sounds of our language, are termed Letters. The two species of script letters in vogue are the small and the capital letters. Small letters are employed in the body of words, while capitals denote distinctions, as in proper names or head-lines.

*The Form-Elements of Script.* Script letters are combinations of form-elements, *i.e.*, combinations of straight lines, angles, and curves. (1) The form-elements of the various systems of script are comparatively few. Spencer, for example, employs only seven principles, the straight line ( | ), the right curve ( — ), the left curve ( — ), the loop ( / ), the direct oval ( O ), the reversed oval ( O ), and the capital stem ( S ). The height, width, and parts, of every letter are definite quantities according to the system adopted. (2) The “down-stroke” of letters is probably the most important element of any system of script, since upon its direction depend, as statistics show, both legibility and rapidity in writing, as well as the physical welfare of the writer. In Spencer’s slanting system the down-stroke meets the writing-line at an angle of 52 degrees, and determines the general slope of the letters. In the various vertical systems the down-stroke meets the writing-line at right angles, and determines the general character of the letters. The connecting lines are next in importance, since upon them, too, depend both legibility and rapidity in writing, as well as the beauty of the finished letters. In Spencer’s system the connecting lines meet the writing-line at an angle of 30 degrees, while in vertical writing the angle must be larger to add to the general effect of the vertical idea. The actual slope of connecting lines is not quite the same in all vertical systems, either to shorten connective curves in the interest of

rapidity, or to add to the beauty of the finished letters. The initial and the terminal strokes are also of importance in any system of writing, since economy of space and time as well as the beauty of the finished letters must depend on these strokes.

**Desirable Properties of Writing.** "Writing is a secondary power of speech, and they who cannot write are in part dumb." In other words, writing is a species of language. As a mode of language, writing should be legible, accurate, rapid, and beautiful, and the physical act should not impair the health of the writer. Right habits should, therefore, be developed from the beginning.

*Legibility.* "Scrawls that cannot be read may be compared to talking that cannot be understood; and writing difficult to decipher, to stammering speech." Legibility is also important to the health of the reader's eyes. It is accordingly the quality preëminent from first to last.

*Accuracy.* All the form-elements required by the adopted system of writing should be present in perfection in script letters. Apart from the bad moral effect of carelessness in these respects, inaccurate letters are likely to be mistaken for others, so that inaccurate writing is more or less illegible. Imitative accuracy will do at first; theoretic accuracy should follow.

*Rapidity.* Beginners should write slowly, so that the hand may become the servant of the will. The moral development of the writer will be promoted by such exercises. The movements in writing should, however, become more and more rapid in the interests of economy, but always in subordination to the will until perfect habit develops.

*Beauty.* Legibility, accuracy, and rapidity are requirements of utility. The union of the useful and beautiful is universally desirable. Taste for artistic penmanship develops into taste for art in general, and stimulates the finer nature of the writer.

*The Requirements of Hygiene.* (1) The position of the body in writing, and the movements of the fingers, etc., should be

the very best. Right habits should be developed from the beginning. (2) That system of writing which is best for the eyes of readers should, all other things being equal, be adopted by our schools.

**The History of Writing.** There are two subjects to study in this connection : (1) The Successive Tendencies in Writing ; and (2) The Claims of the Tendencies.

*The Tendencies in Penmanship.* The tendency to write upright letters was the earliest tendency in the history of writing. "It was not until the beginning of the sixteenth century that the sloping or Italian style was invented by Aldus Manutius of Venice. It soon became a fashionable fad and spread rapidly over all Europe. Probably the best reason for this was that writing in those days was to a great extent in the hands of professional scribes, and, as the slanting style was peculiarly favorable to the development of the new art of flourishing, it soon supplanted the old vertical mode." "In the course of time, when education became the common possession of all, slanting writing retained its supremacy unchallenged. No attempts were made to return to vertical penmanship until a few years ago, when an investigation of the causes of curvature of the spine and imperfect vision so common in school-children was instituted in Germany, with the result that eminent medical authorities attributed the greater part of the evil to the position of the body and eyes necessary in writing a slanting hand. At about the same time teachers began to awake to the fact that the writing of their schools was anything but satisfactory." "With the assurance from the medical profession that slanting penmanship produces deformity and imperfect vision, and from educational experts that vertical penmanship is far superior to sloping, it would appear that vertical writing is to be the writing of the future. It has already been extensively introduced on the Continent and in England, and has recently aroused absorbing interest in this country."

*The Merits of Vertical Writing.* The advantages of vertical writing are as follows: (1) It is better for the health of pupils. The required position is natural and easy, since the back must be straight and square, and both eyes must be exercised equally.

(2) Vertical writing is more legible, as can be shown by a diagram of upright and slanting lines. (See Merrill's *Vertical Penmanship*.) This claim is confirmed by the fact that books are commonly printed not in Italic, but in plain, upright letters. The fact that English civil-service examinations ask for upright writing is an additional proof.

(3) Vertical writing is more rapid. There is less distance for the pen to travel in making vertical strokes than in making slanting strokes of the same height. The difference between the down-strokes of vertical penmanship and those of slanting penmanship is as great as that between the perpendicular and the hypotenuse of a right angled triangle. There is, therefore, a considerable gain of time in vertical writing. Telegraph receiving operators avail themselves of this advantage almost unconsciously.

(4) Vertical writing is more economical. Its shorter down-strokes save time and paper. The greater legibility of vertical writing, as well as its greater adaptability to learners, must also be regarded as matters of economy.

(5) Vertical writing is easier to teach and learn. The positions of the body, hands, and eyes are perfectly natural to the child, and consequently do not have to be painfully inculcated. It is unnatural for a child to write with slanting down-strokes. Hence it will cost both teacher and pupil many hours of needless labor to attain uniformity in these strokes. Statistics show that children have better success in the vertical efforts, and that this success is a constant stimulus to their efforts.

*The Merits of Slanting Writing.* There are several things to be said in favor of the slanting system of writing: (1) The

possibility of remarkable beauty belongs exclusively to slanting writing. The history of slanting penmanship is incontrovertible evidence on this point. There is an irresistible charm in the graceful poise of the classical slant. The vertical letter is stiff in comparison. If the future history of penmanship is to be that of a fine art, as the rapid adoption of short-hand seems to indicate, the slanting system deserves a place in special training.

(3) The transition of schools to the vertical system is difficult. The amount of time and labor needed to break higher grade pupils into the new habit, is an important consideration. Then, too, teachers need special training in vertical penmanship in order to do good work. These objections have, however, been satisfactorily met in hundreds of schools, and the probability is that the change will rapidly become universal.

### B. INSTRUCTION IN WRITING.

The study of the nature of writing suggests the following topics for consideration: (1) Courses of Writing; (2) Methods of Instruction; and (3) The Importance of Writing.

**Courses of Writing.** In obedience to the law of the pupil's natural development, and in accordance with the demands of life, there should be three courses in writing: (1) The Elementary Course; (2) The Intermediate Course; and (3) The Higher Course. The elementary course is designed to develop mechanical ability; the intermediate course, to correct and perfect practical ability by adding theory; the higher course, to develop special tastes, or to fit for special vocations. (See Principles of Instruction.) The common school owes her pupils a training in the first two courses; the higher course belongs to special schools, such as business colleges, etc. The elementary course should be covered in two or three years; the intermediate course, in from four to eight years, the time to be determined by circumstances. The end in view in the ele-

mentary course is imitative skill ; in the intermediate course theory ; and in the higher course excellence. The designs are in harmony with the stages of possibility in pupils as ascertained by experiments, and they are in accord with the needs of life.

# I. THE ELEMENTARY COURSE IN PENMANSHIP.

The questions to be considered under this heading are two : (1) The Tasks of the Elementary Course, and (2) The Methods of Elementary Lessons.

**The Tasks of the Elementary Course.** The first lessons in writing are to be given in connection with reading, spelling, language lessons, etc. (1) The pupil must be required to copy words. (2) There must be supplementary lessons on separate letters. (3) Right habits of position, movement, spacing, etc., must be developed from the beginning.

**The Methods of Elementary Lessons.** In the elementary exercises of penmanship, the pupil must be required to observe and copy. (1) The little words that are read in elementary language lessons, should be correctly written on the board in sight of the pupils. The pupil should be required to observe what the teacher does, and then try to write the word on the slate. At first it may be necessary to guide the little hands, but they will soon learn to trace legible copies. (2) As soon as the pupils can write words legibly, lessons on letters should begin. The small letters should of course be taken up first, and in the order of their increasing difficulty. (See this order, pages 141 and 142.) The lessons on capital letters may begin before all the small letters have been taught, but also in their order of difficulty. The letter to be taught should be written several times on the board, larger at first and smaller afterwards, the pupils observing what the teacher does, and then copying the letters on their slate, or on the board. A great deal of such practice can be readily com-

bined with reading lessons. Children should sometimes be requested to write on paper, but the pen and the copy-book are hardly appropriate before the third year of school. (3) Right habits of position, movement, spacing, slanting, etc., are best taught at first by example. In other words, the position, movement, etc., must be illustrated by the teacher and copied by the pupil. Failures are best corrected by kindly suggestion. The teacher must see to it that children do not write too fast, and that they do neat work. He should, however, be thoroughly judicious in pointing out mistakes and imperfections, never losing his temper or hurting the feelings of pupils.

## II. THE INTERMEDIATE COURSE IN PENMANSHIP.

**The Tasks of the Intermediate Course.** The lessons of the intermediate course in penmanship should begin the third or fourth year of school, and should combine theory and practice. The following subjects should be mastered in their order: (1) Positions at Desk, (2) Holding the Pen, (3) Finger Movement, (4) Fore-arm Movement, (5) Combined Movement, (6) Whole-Arm Movement, (7) Lines, (8) The Form-Elements, (9) Small Letters, (10) Capital Letters, (11) Spacing, (12) Shading, and (13) Arabic Figures.

**The Methods of Intermediate Lessons.** (1) In the intermediate exercises of penmanship, the pupil needs practice paper, a copy-book suited to his grade, a good pen, good ink, and a suitable desk. (2) It is convenient, and at the same time effective, to teach a whole class at once. Two, or, in some cases, three classes are enough for any school. (3) In this course accuracy and beauty are the right ideals, and great effort should be put forth to develop taste for these ideals. (4) There should be a system of signals, and everything should be done in the most orderly way. The recitation may begin with (1) Position at Desk, (2) Arrange Books, (3) Find Copy and Adjust Arms, (4) Open Inkstands, (5) Take Pens. The reci-



tation may close with (1) Wipe Pens, (2) Front Position, (3) Pass Pens, (4) Pass Books, (5) Close Inkstands. (See "Theory of Spencerian Penmanship.")

*Position at Desk.* (1) The position for writing should be a convenient one, allowing the easy action of the right arm and hand. In sitting at a desk or table there is little choice between what are known as the "Left-side," "Front," "Right-oblique," or "Right-side" positions. They are all practised by writers; but it is well for the sake of order and uniformity in a class that all the pupils should observe the same position. Whichever method is adopted, those who do not wish to become hollow-chested or round-shouldered, should learn to sit easily upright, and keep the shoulders square.

(2) The "Front" position is most appropriate in classes. Pupils should be required to "Sit directly facing the desk, near to it, without leaning against it, with the feet level on the floor, and the fore-arms resting lightly on the desk in front at right angles to each other. Let the right arm rest lightly on the muscles forward of the elbow—keep the wrist above the paper, and rest the hand lightly on the nails of the third and fourth fingers, which should touch the paper directly under the palm. Adjust the book so that the right arm will be at right angles to the lines on which you are to write. Hold the book in place with the fingers of the left hand."

*Holding the Pen.* Pupils should be required to "Take the pen between the first and second fingers and the thumb, observing, 1st, that it crosses the second finger on the corner of the nail; 2d, that it crosses the fore-finger forward of the knuckles; 3d, that the end of the thumb touches the holder opposite the lower joint of the fore-finger; 4th, that the top of the holder points toward the right shoulder; 5th, that the wrist is above the paper; 6th, that the point of the pen comes *squarely* to the paper."

*Finger Movement.* (1) The action of the first and second

fingers and thumb, is termed the "Finger Movement"; it is used chiefly in the upward and downward strokes. (2) Pupils should be required to make this movement deliberately, counting 1, 2, 1, 2, etc., or saying *upward*, downward, etc.

*Fore-arm Movement.* (1) "The Fore-arm Movement consists in the action of the fore-arm upon its muscular rest near the elbow; the hand gliding on the nails of the third and fourth fingers. It may be employed in making strokes in any direction, but is especially adapted to carrying the pen rightward, and leftward, across the paper, and is most efficient in combination with the Finger Movement."

(2) Pupils should be required to practise this movement in combination with the finger movement until the complex process becomes almost automatic. The teacher must be able to show the pupil what to do, and should insist on right habit.

*Combined Movement.* (1) "The Combined Movement consists in the united action of the fore-arm, hand, and fingers, the fore-arm acting on its muscular rest as a centre, and sliding the hand on the nails of the third and fourth fingers, while the first and second fingers and thumb extend and contract in forming upward and downward strokes."

(2) "This movement answers the requirements of business better than any other: it combines the free untiring sweep of the fore-arm, with the delicate shaping powers of the fingers, securing ease and accuracy."

(3) The teacher should carefully study this movement as explained in special text-books, in order that he may understand what he tries to teach. He should illustrate the movement again and again, until all in the class can make the movement.

*Whole-arm Movement.* (1) "The Whole-arm Movement consists in the use of the whole arm from the shoulder, the elbow being raised slightly from the desk, and the hand sliding on the nails of the third and fourth fingers."

(2) "The capitals *Q, C, Q, L*, etc., may be traced with the whole-arm movement, and the strokes regulated by counting, as indicated by figures in copy-books. This movement is mainly used for striking large capitals. Its practice is highly beneficial, as it brings into free action all the muscles from shoulder to fingers."

*Form Lessons.* Preparatory to lessons on the structure of the various letters, there should be special lessons on lines, angles, etc. (1) Pupils should be required to make and describe a line, a straight line, a curve line, a right curve, a left curve, a horizontal line, a vertical line, a slanting or oblique line, and parallel lines.

(2) Pupils in writing must be taught what an angle is, and how to measure it in degrees of a circle. Teachers of slanting penmanship must make their classes familiar with the angle of 52 degrees, or Spencer's Main Slant, and with the angle of 30 degrees, or Spencer's Connective Slant. Teachers of vertical penmanship must see to it that the pupils know the right angle.

(3) The teacher must take pains to show the pupils how to combine strokes in forming letters; how to make the "short turn," the "oval turn," the "loop," the "angular turn," the "direct oval," the "reversed oval," etc.

*Form Elements.* The pupil of any system must be taught to make and describe the constituent parts of letters, and to analyze letters, small and capital, into these elements.

*The Small Letters.* The small letters should be taken up in the following order: (1) The thirteen "short" letters, namely,

*i, u, w, n, m, v, x, o, a, e, c, t, s.*

(2) The four "semi-extended" (two spaces) letters, namely, *t, d, p, q.* (3) The nine "extended," or loop letters (three spaces), namely, *h, k, l, b, j, y, g, z, f.*

These letters should be studied, practised, and reviewed, until each one becomes perfect.

*The Capital Letters.* The capital letters should be taken up in the following order: (1) The four "Fifth Principle" letters, namely, *O, E, Q, C.* (2) The nine "Sixth Principle" letters, namely, *W, N, L, Z, V, U, Y, I, J.* (3) The thirteen "Seventh Principle" letters, namely, *A, K, M, G, F, H, X, S, T, B, P, R.* These letters, too, must be studied, practised, and reviewed until they are mastered.

*Spacing.* The teacher must see to it as much as possible that the space between letters, words, and sentences, is understood and respected by pupils. The teacher is referred to the copy-book explanations.

*Shading.* Beginners in penmanship should not be taught "shading." When pupils have acquired artistic skill in writing letters without shading, it is time enough to begin lessons on that subject. The five species of shading as seen in the letters *t, p, l, y,* and *O,* should of course in due time be taught.

*Arabic Figures.* Lessons on the Arabic figures

*1, 2, 3, 4, 5, 6, 7, 8, 9, 0,*

should be given in connection with the small letters, and accuracy as well as neatness should be developed into habits.

### III. HIGHER COURSES IN PENMANSHIP.

Inasmuch as it is not the duty of the common school to offer higher, or special, courses in penmanship, the details of instruction in such courses need not be considered in this treatise. The special courses in penmanship offered in special schools are as follows: (1) Business Penmanship; (2) Ladies'

Penmanship ; and (3) Ornamental Penmanship. The special requirements of business, etiquette, and decorative art, determine the tasks and methods of such courses. (See the Ninth Principle of Instruction.)

#### IV. THE IMPORTANCE OF PENMANSHIP.

The unsightly, hurried scrawls that are so common in all species of writing, are greatly to be deplored. Such writing is to be deplored because : (1) The discipline of penmanship has a moral and practical radius, and (2) Artistic penmanship is a desirable instrument in business and social papers.

**The Discipline of Penmanship.** The habits and tastes cultivated in the efforts to master penmanship, assert themselves as habits and tastes in the moral and practical life of pupils. In other words, the habits of self-control, attention, accuracy, and artistic finish, which pupils must cultivate in order to master penmanship, are likely to become their habits and tastes in all activities.

**The Desirability of Artistic Penmanship.** Except in cases of deliberate acting, most persons photograph their ordinary character in their handwriting. This fact has important consequences. (1) Employers look for self-poise, energy, taste, and manliness, in their employees. These characteristics, and their opposites, as just pointed out, are often detected in the letters of applicants for positions, and the employer makes up his mind accordingly. School directors, for example, may not themselves be able to write well, but many of them know how important it is that the teacher of their children should write a good hand, and, all other things being equal, they prefer the good penman.

(2) What is true of business intercourse is equally true of written social intercourse. We think better of our correspondents when they write a legible and artistic hand. This preference seems to rest on the belief, though it may never

have been put in so many words, that our friends are likely to resemble their handwriting in other respects and in their relations to us.

**The Requisite Training for Teachers of Penmanship.** It is obviously the duty of the common school to cultivate penmanship both for its disciplinary and its practical worth. Teachers have no moral right to neglect either their own handwriting or that of their pupils. The consequences of such neglect are too difficult to correct, and too far-reaching in the pupil's career. It is requisite, therefore, that teachers understand (1) The theory of penmanship, and (2) The theory of teaching penmanship. In addition to such understanding, it is necessary that teachers have artistic ability in penmanship. Indeed, a knowledge of higher courses in penmanship, and training in each of these courses, so far as possible, develops an appreciation for the art of penmanship, and leads to an ability in it, that fit teachers to work from better standpoints and to much better advantage. The Normal Schools especially owe it to the public schools to send out teachers that are able to write and to teach writing.

## CHAPTER V.

## SPELLING.

THE pedagogics of spelling is concerned with (1) The Nature of Spelling, and (2) Instruction in Spelling.

## A. THE NATURE OF SPELLING.

It will serve our purpose to study (1) The History of English Orthography, (2) The Physical Structure of English Words, and (3) The Psychology of Spelling.

**The History of English Orthography.** Among the things that have shaped our orthography are (1) The Origin of the Alphabet, (2) The Norman Conquest of England, (3) The Practice of Authors and Copyists, (4) The Invention of Printing, and (5) The Publication of English Dictionaries.

*Origin of the Alphabet.* "Before or during the rule of the Hyksos in Egypt, the Phœnician settlers in the Delta borrowed from the Egyptians twenty-two hieratic characters, which they passed on to their Asiatic kinsmen. These characters received new names, and became the Phœnician alphabet. Now, wherever the Phœnicians went, they carried this alphabet as 'one of their exports.'" (See "Current Literature," March, 1897, for another interesting account of the origin of the alphabet.) "It was through the Phœnicians, probably, that the Greeks received it; the Greeks passed it on to the Romans, and the Romans gave it to the German peoples. In this way did our alphabet come to us from Old Egypt." In this historical process some of the original characters were dropped, the phonetic value of others was greatly changed, and some

new letters were introduced. Thus it came that some letters represent more than one sound, and that the same sounds often have more than one alphabetic representative.

*The Norman Conquest of England.* The Roman missionaries were the first to reduce the Anglo-Saxon language to writing. "They used the Roman letters, in nearly their Roman value, and added new characters for the sound of *a* in *fat*, *th* in *their* (dh), *th* in *thine*, and *w*." In the fusion of Normans and Saxons, after the Norman Conquest, neither party could pronounce the words of the other party correctly, and, in spelling these mispronunciations, they introduced many lamentable irregularities.

*The Practice of Authors and Copyists.* Before the invention of printing, authors spelled words very much as the mood of the moment dictated. There was no authorized orthography for any word. Thus it happened that words were spelled differently by different authors, and that the same author spelled a word in more than one way. This was true even of proper names, such as *Leicester*, *Villers*, *Mainwaring*, etc. Lower states that the word *Mainwaring* was spelled in one hundred and thirty-one different ways. To make the matter worse, the scribes that multiplied manuscripts, were careless in spelling. There were some authors, it is true, who tried to prevent these evils and to correct them. "The spelling of the *Ormulum*, which was written in the thirteenth century, though strange and cumbrous, is remarkable for its regularity; and the author urges his copyists to follow his orthography with the utmost exactness. Chaucer, also, more than a century later, carefully revised and corrected his own works; and he enjoined upon his scribe to 'write more trew' that which was entrusted to him, saying that he was obliged 'it to correct and eke to rubbe and scrape,' because of the negligence and haste with which it had been copied." The orthography of Shakespeare's times, though so much later than that of Chaucer, was



far from settled ; even the name of the great poet was written more than thirty different ways.

*The Invention of Printing.* When, about the middle of the fifteenth century, printing by means of movable types, was invented, the wretched spelling of authors unfortunately became a somewhat fixed orthography. To make the matter worse, printers often spelled words as prompted by convenience of space, now adding a letter, now omitting it, to suit the particular case.

*The Publication of Dictionaries.* At last the era of lexicographers was ushered in. The most distressing irregularities of spelling began to disappear, and conformity to orthographic principles took their place. Of course, it was impossible to reduce chaos to order at once, but Dr. Johnson's celebrated dictionary, published in 1755, settled usage definitely in favor of some one of the numerous forms in which words were written, and thus removed the cause of confusion. In other words, Johnson's dictionary became a standard of English orthography. The great lexicographers, Noah Webster and Worcester, followed in 1828. They introduced orthographic changes that met almost universal approval. First, they restored primitive spellings in order to reveal etymological affinities, and second, they reduced as much as possible the number of anomalies and special cases. Notwithstanding the improvements made by Johnson, Webster, Worcester, and other lexicographers, English orthography continues to distress those who must use it.

**Spelling Reforms.** Many attempts have been made to introduce a system of phonetic spelling, *i.e.*, a system in which each elementary sound of a word is represented by its own alphabetic sign. Among the first to attempt a phonetic system was Sir Thomas Smith (1568), Secretary of State to Queen Elizabeth. Eminent scholars in the times of Charles I. introduced orthographic changes, and tried to popularize pho-

netic spelling ; but, inasmuch as these efforts did not rest on settled principles, the effects were not permanent. In modern times, Dr. Franklin invented a phonetic system, but it was imperfect, and he scarcely used it himself except in a brief correspondence with a friend. Among recent attempts are those of A. J. Ellis, I. Pittman, E. Jones, and A. M. Bell. The system of Mr. Bell has been used in scientific treatises, but seems not to be gaining any permanent hold. Many leading philologists of England and America are advocates of reform in orthography. Dr. March, Professors Whitney and Haldeman, of America, and Max Müller, Ellis, and Jones, of England, are some of the foremost advocates of spelling reform. The Funk & Wagnalls "Scientific Alphabet" probably indicates and paves the way for the most practicable reform in spelling. By means of a clever diacritical system and two additional letters, our present alphabet becomes the means of an almost perfect phonetic orthography.

Such a reform is certainly desirable. It will save time and labor in schools ; it will save time, labor, and expense, in printing. Moreover, the proposed changes in orthography are not so violent as to seal the volumes of the old-style orthography.

**Physical Structure of English Words.** A language in which each elementary sound is represented to the eye by a special letter, is termed *Phonetic*. English orthography, as we have seen, is very irregular. "This irregularity consists in the use of silent letters, and in the use of different letters and combinations to represent the same sound. Many letters are pronounced in several different ways, while the letters or combinations of letters for a single sound, in some cases amount to scores. Many words of no more than two syllables may be spelled in several thousand different ways, by the use of combinations actually employed in other words of the language. The word *scissors*, it is computed by Ellis, may be

thus written in nearly six thousand different ways. Indeed, it may be truly said that we possess the worst alphabetic spelling in the world. English orthography is 'the opprobrium of English scholarship'; it is the greatest hindrance to education and to the spread of our language." And yet (see page 151) "over nine-tenths of our words can be classified; that is, the sounds of the letters can be determined by their relation to others in the word."

**The Psychology of Spelling.** The physical structure of words determines the necessary mental acts in spelling.

*Oral Spelling.* (1) The orthography of many words must be learned, as other "facts" are learned, by observation, *i.e.*, by the use of judgment in connection with the senses. Attention makes any word, however irregular it may be, a possession of memory. Imagination is a strong reinforcement of memory both in learning and using the letters of a word. (2) The "rules" of spelling (see page 151) must be learned by induction, and (3) used by deduction.

*Written Spelling.* The spelling of a written word may, of course, be learned "by ear" alone, provided one has already learned the alphabetic letters, for then the imagination will furnish a sight-substitute; but commonly the eye is the most effective means. The most effective way of learning the orthography of a word is to *write* the word, thus reinforcing sight by muscular sensation. This combination in learning to spell a word will generally insure its correct use in composition.

## B. INSTRUCTION IN SPELLING.

The topics to be considered under the head of "Instruction in Spelling," are as follows: (1) The Preparation of a Spelling Lesson; (2) The Recitation of a Spelling Lesson; (3) Supplementary Devices in Spelling; (4) Relative Merits of Written and Oral Spelling; (5) Principles of Instruction; (6) Course of Lessons; and (7) The Importance of Spelling.

## I. THE PREPARATION OF A SPELLING LESSON.

That which is to be learned in this case necessitates associative memory reinforced by rules as much as the nature of the subject admits. (See the Sixth and Tenth Principles of Instruction.) Associative memory as a process begins in observation. Hence it follows that in order to master words in spelling the pupil's tasks are three: (1) Observation; (2) Recollective Practice; and (3) The Discovery and Use of Rules.

**Observation.** Perfect observation is indispensable to true associations. Persistent associations, *i.e.*, abiding memories, are assured by multiplying association-tracks in observing that which is to be remembered. (See Summation of Stimuli, page 25.) Thus we see that pupils should study a word not only with the eye, but also with the hand, ear, and voice. That is to say, the pupil should observe the spelling of a word (1) by looking at it critically, regarding its letters, syllables, and the word as a picture-whole, (2) writing it, (3) comparing it with the word copied, (4) naming the letters in their order until it becomes an easy and accurate process, (5) pronouncing the syllables successively and as a whole. The teacher must make sure that pupils acquire the habit of thus observing words. The black-board and slates, or tablets, should be used.

**Recollective Practice.** In order to assure persistent associations, the learner dare not be content with the observation just described. He must repeatedly write the words which he has studied, name the letters of the word of which he thinks, or spell it orally at some one else's dictation, comparing the results to see if the attempted associations be true. This work dare not be neglected except at the risk of losing what was gained only by hard work at first. (See Second Principle of Culture.)

The teacher must see to it that pupils get this practice.

**The Discovery and Use of Rules.** Observation and recol-

lective practice are necessities especially because of the irregularities of orthography. But, as indicated in the beginning of this chapter, there are conformities to law in English orthography, which, though they seem "few and far between" to the thoughtless, can be discovered and utilized in learning to spell. Indeed, memory finds a most grateful reinforcement in more than a few rules, or laws, of spelling. Among the most serviceable rules, though of course there are exceptions, are the following :

1. Final *e* is dropped before a suffix that begins with a vowel ; as, *write*, *writing*.

2. Final *e* is retained before a suffix that begins with a consonant ; as, *state*, *statement*. Exception, *judgment*.

3. Final *y* preceded by a consonant is changed to *i* before a suffix that does not begin with *i* ; as, *lady*, *ladies*.

4. Final *y* preceded by a vowel sound is retained before all suffixes ; as, *joy*, *joyous*, *enjoyment*, *chimney*, *chimneys*.

5. After a single vowel, the final consonant of any word accented on the final syllable, is doubled before a suffix that begins with a vowel ; as, *control*, *controlled*, *flit*, *flitting*.

6. After a single vowel, the final consonant of any word not accented on the final syllable, is not doubled before a suffix that begins with a vowel ; as, *benefit*, *benefited*.

7. After single vowels, final *f* and *l* of monosyllables are generally doubled ; as, *bell*, *staff*.

8. After diphthongs, or more than a single vowel, the final consonant is never doubled ; as, *reveal*, *revealing*.

9. Words relating to matter end in *ceous*, and others end in *cious* ; as, *cretaceous*, *ferocious*.

10. In such words as *conceive* and *receipt*, *c* is generally followed by *ei*, and other letters of the alphabet by *ie* ; as, *belief*, *retrieve*.

There is no sufficient reason why pupils should not be required to look for such rules and to justify their spelling by

reference to these rules when they apply to the case in hand. For a full discussion of such rules see Worcester's Unabridged Dictionary.

## II. THE RECITATION OF A SPELLING LESSON.

What the requirements of a recitation in spelling may be, depends very much on the means to be used in reciting. When the words are to be written the necessities are very different from those of an oral recitation, whether it be alphabetic or phonetic. It seems most convenient to consider written spelling first.

### a. WRITTEN SPELLING.

The points to be considered are as follows: (1) Preliminaries; (2) Giving out the Words; (3) Spelling the Words; (4) Corrections; (5) Assignment of Lessons; and (6) The Meaning of Words in Spelling Lessons.

**Preliminaries.** The words to be spelled should not be given out before the class is properly seated and supplied with the most desirable writing materials, or before the class has passed to the black-board and taken the most suitable places according to thoughtful directions on the part of the teacher. The most suitable writing materials for spelling classes are prepared blank books, together with pen and ink. On passing to the board, if that be the mode of recitation, the pupils should be required to prepare the board, *i.e.*, to erase whatever may have to be erased, to space the board by means of vertical lines, and to write their names neatly near the top toward the right upper corner of their respective spaces. Whether seated or standing, all members should be required to maintain a natural and graceful posture. No disturbing conduct should be tolerated, and absolute attentiveness should be developed in all parties about to engage in the recitation.

**Giving Out the Words.** When everybody is ready,—and that should be as soon as possible,—the words should be pro-

nounced in such order as the teacher thinks best. The words should, of course, be pronounced distinctly and correctly, but only once, except for good reasons. For obvious reasons it is generally better that the teacher, rather than a pupil, gives out the words. As soon as a word has been written, some pupil ought to be requested to use it in an illustrative sentence, or to tell in his own way what the word means. It is often good for the pupil's development to associate the meaning of words with the spelling. The teacher should have a stock of illustrations on hand for use in every recitation.

**Spelling the Words.** (1) As suggested, prepared blank-books, rather than slates, should be used in written spelling. As soon as pupils are able to do so, they should be required to write the words with pen and ink. This method effectually prevents erasures and "second trials," first steps to indecision and dishonesty, two serious habits to which human nature is so prone. (2) To develop the habit of capitalization and punctuation, frequent dictation lessons should be conjoined with the regular spelling lists. In these lessons the teacher frames the words of the list into sentences. He reads these sentences in parts, if necessary, or as a whole, when possible, and requires the pupils to write them correctly. (3) In lists, or columns, of written words, only proper names require capitals. (4) The pupils should frequently be required to write the words in separate syllables, the separation being denoted by spaces, rather than by hyphens. This device reserves the hyphen for its more distinctive uses in compound words and at the end of a line of writing. (5) With younger pupils it is well to use slate and pencil at first, and paper and pencil afterwards, until they may be trusted with pen and ink. The words should be written in columns and numbered. (6) The black-board is often better than either slate or paper. It is especially useful when words are to be spelled in separate syllables. A spelling lesson on the black-board is sometimes an agreeable variation

from the other modes of written spelling. The words should be written in columns and numbered.

**Corrections.** At a signal from the teacher, the pupils may exchange blank-books at the seat, or places at the board, care being taken to prevent cheating. The pupils may also be allowed to correct their own lists, in order to develop moral responsibility. The right of appeal to the teacher must be allowed when pupils do not correct their own lists, and the teacher should frequently inspect the corrected lists to make sure of his pupils. In the case of younger pupils such inspection must obviously be most frequent. Corrections may be indicated by crosses, figures, or any other good device upon which the teacher may determine. At the close of every regular recitation in spelling, the misspelled words should be recorded in a book kept for that purpose. If prepared blank-books are used by the class, the words may be correctly written right after the incorrect spelling. This is probably the best way; it requires the pupil to compare words, and saves the teacher the trouble of constant inspection.

**Assignment of Lessons.** At the close of the recitation, if the pupils are young, the list of words for the next lesson ought to be pronounced. The pupils should have the first chance to pronounce the words of the prospective lesson. In case of failure, the teacher must come to the pupil's rescue. He may simply pronounce the difficult word, and require the pupils to imitate his pronunciations. But the better way is to resort to phonic drill in the case of difficult words. (See chapter on Reading.) Mischievous must come from any neglect on the part of the teacher to see to these pre-pronunciations.

**The Meaning of Words in Spelling Lessons.** (See under Oral Spelling.)



*b. ORAL SPELLING.*

The points to be considered are as follows: (1) Preliminaries; (2) Giving out the Words; (3) Spelling the Words; (4) Assignment of Lessons; and (5) The Meaning of Words.

**Preliminaries.** If the method of "trapping" is not to be used, the pupils of the oral spelling class may be either seated or standing. In either case, they should be required to assume a healthful and orderly posture. It is thought best, however, to require the class to stand rather than to sit; this posture is a physical relief to pupils, and prepares them to sit still when they return to their respective seats. Then, too, if the trapping system is used, the standing posture is obviously more appropriate.

**Giving Out the Words.** (1) The trapping system of course requires that the words be passed from the upper to the lower end of the class in regular order. When trapping is not allowed, the words may be assigned to any pupil at pleasure. The former method is advisable as a stimulus. (2) The words should not be given out in any order which might tempt the pupils to commit it. If this caution is not observed, pupils are likely to prepare only those words which they expect to get in their turn. (3) In giving out the words of a spelling lesson, the teacher should not, except for good reasons, pronounce a word more than once. If he falls into the habit of pronouncing the words oftener than once, the pupils will expect him to do so. In that event, they will become habitually inattentive, thus trying the teacher's patience, wasting valuable time, and fitting themselves for failures in later years. (4) There are various methods of passing from word to word in assigning them to a class. (*a*) The same word may be assigned by nod of the head, or other appropriate signal, to more than one pupil, just as if it had been misspelled. This method develops attentiveness and certainty as to the spelling

of a word. (b) Whenever a word is misspelled, the next word may be assigned. The pupil to whom it is assigned is expected to spell the word that was missed rather than the word after it. If the pupil fails to do this, the teacher gives out a new word, and keeps on giving out new words until some one spells the word that was first missed. The pupil that spells this word, takes the place of the pupil that missed it, or, if it has passed the "head" of the class, he "goes up head." This is possibly the best method. It develops the greatest attention, and stimulates to thorough preparation of the lesson. Both methods, (a) and (b), may be used in every recitation. The variation is very stimulating. (5) The teacher should not allow himself to fall into the habit of saying "right," "wrong," "next," etc. This habit is not only ludicrous, but cultivates an undesirable dependence of the pupils on the teacher. (6) Sometimes false sympathy prompts teachers to suggest the spelling of a word by pronouncing it in such a way as to name the letters. Thus, teachers are sometimes tempted to say *orātōr* for *orator*, *infīnite* for *infinite*. This is evidently wrong. If the pupil cannot spell a word when it is pronounced as it would be in good speaking or reading, the pupil does not know the word, and should fail. The ability to pronounce words as they should be pronounced is obviously indispensable in teaching spelling.

**Spelling the Words.** (1) In the oral spelling class, the pupil should be required to pronounce the assigned word before he attempts to spell it. This precaution assures both teacher and pupil that the word was understood, and thus avoids disputes, as well as other evils. (2) There are three possible things to do after the pupil's pronunciation of a word: (a) The pupil may name the letters of each syllable in order, pronouncing each syllable in its order, but only once, and the word as a whole at last. (b) The pupil may name the letters as before, pronouncing each syllable in its order, and then

again in its proper connection with all the syllables that precede, thus pronouncing the last syllable twice in all, the second last syllable thrice, etc. Illustration: *Pärägräph*; *p, a, r* (*pär*), *ä* (*ä*), *pärä, g, r, a, p, h* (*gräph*), *pärägräph*. (c) The pupil may name the letters as before, pausing at the end of each syllable, and pronouncing the word as a whole, thus pronouncing each syllable only once. (3) The first method (a) is probably proper for younger pupils as a drill in pronouncing. The second method may be even better, so long as the words to be spelled are not long polysyllables. In classes that are ready for polysyllables, the third method is less awkward, saves time, and is sufficiently suggestive of the syllables that make up the word. Indeed, it may be questioned whether the first two methods accomplish that which is commonly claimed for them. It seems far better to teach the pronunciation of words by phonic drills. This procedure reserves alphabetic spelling to its legitimate sphere, *i.e.*, naming the orthographic characters of a word.

**Assignment of Spelling Lessons.** (See under Written Spelling.)

**The Meaning of Words in Spelling Lessons.** (1) In the spelling lessons that accompany reading lessons, as well as in those incidental spelling tests that belong to all lessons, "meanings" should, of course, be taught with spelling. This is evidently advisable, but in the interests of the lessons to which the spelling is supplementary, rather than in the interest of spelling as spelling. On grounds of convenience, these supplementary lessons in spelling should be oral lessons. But oral spelling loses its native interest when interrupted by tests on "meanings." Therefore, except in cases where the meaning of words, rather than their pronunciation, determines the spelling, the tests on meanings should either precede or follow the regular spelling exercise.

(2) In our days it is supposed that only heretics in educa-

tion would advocate spelling lessons in which the meaning of all the words cannot be taught. This is high ground to take. The view is based on a false creed in psychology and pedagogy. (a) In the first place, it is wrongly supposed that memory ought to be absolutely dependent on the understanding. The order in which the mental functions mature confutes this theory. (See the eleventh law of Mental Activity.) Then, too, a good mechanical memory, *i.e.*, associative memory unassisted by the understanding, is the best equipment for more than one important task in the practical affairs of life. (b) In the second place, it is economy in pedagogy to teach the younger pupils the spelling of words whose meanings they cannot fully master for the time being on account of immaturity. This conclusion follows from several obvious facts: First, the mind of younger pupils is able to spell, though unable to master meanings. Second, the programme of younger pupils is not crowded. This leaves room for stress on spelling as spelling. Thus time and possibilities are utilized. Third, the competitive interest is present as a sufficient stimulus to the necessary associative efforts. Fourth, the meanings of words are readily mastered in due time, whereas the spelling of words requires too much time and effort when the epoch of thought-lessons has come.

(3) It is therefore maintained, as we think, on sufficient grounds, and earnestly advocated, that regular spelling lessons from spelling-books be kept in our course of studies, whether or not we find time enough to teach the meaning of all the words as fast as we go in spelling. If any other argument is demanded, it may be confidently affirmed that those who learned to spell under the old spelling-book stimulus are infinitely superior in practical spelling. There is no doubt about it that the spelling-book has been abused, and that it will be abused; but, all things considered, its legitimate use will produce an ability in spelling that is most gratifying, whereas its

disuse has sent a great host of Josh. Billings into our Normal Schools, Colleges, and other spheres. The necessary "stress" on spelling as spelling is best secured by systematic, persistent use of a good spelling-book.

### III. SUPPLEMENTARY DEVICES IN SPELLING.

The tasks of the pupil in learning to spell, as pointed out, are, (1) Observation; (2) Recollective Practice; and (3) The Discovery and Use of Rules. But the pupil will be more likely to perform these tasks vigorously and habitually if the proper stimulus is supplied. In most instances it is not an adequate stimulus, to insist simply on the importance of spelling. This argument somehow fails to touch the ordinary pupil to the quick. Any appeal to the competitive instinct is more effective. The competitive instinct is utilized in the following devices: (1) The Method of Trapping; (2) Reviews; (3) Recreations in Word-Building; and (4) Spelling Matches.

**The Method of Trapping.** The "trapping" system is most effective in oral recitations, and with younger pupils, but can be used to advantage in written recitations, and with older pupils. (1) In the written recitation the number of errors determines the respective places. The matter must be settled at the close of the recitation, though the places should not be taken until the next recitation. The pupil will usually see to it that places are not wrongly taken. The seats, slates, corrections, etc., must be carefully supervised to prevent dishonesty. (2) In oral recitations the temptation to cheat is not so great, and attempts to do so are more readily detected. The method of trapping in oral spelling classes adds a difficult task to that of conducting the class, namely, the prevention and cure of such feelings as anger, envy, pride, etc. Vigilance and absolute justice are therefore imperative. It is a good plan to require the pupil at the head to start again at the foot. This

device is in most instances enjoyed as much by the pupil that goes down foot as by the others.

**Reviews.** It was pointed out that at the close of regular written recitations in spelling, the misspelled words should be recorded in a book kept for that purpose. At stated times these lists should be used as a review lesson. The words marked as misspelled in oral recitations may also be used in the same way. The importance of such reviews can hardly be over-estimated, seeing that they make it necessary for pupils to study the very words which ought to be studied. The list of words to be spelled in reviews may, for the same reason, be selected from readers, examination papers, compositions, etc., but always with adaptation to the pupils' grade. (See First, Second, and Third Principles of Instruction.)

**Recreations in Word-Building.** Various recreations in spelling have been proposed by ingenious teachers. These devices are useful as supplementary work for pupils whose time cannot otherwise be advantageously utilized. It is, however, doubtful whether such recreations should ever be allowed to take the place of the ordinary spelling lessons. As a stimulus to word-building the following recreation has been proposed: The pupil takes any fertile word, as *subscription*, and writes in a column all the words which he can construct, using any letter of the given word only once in each new word, or as often as it occurs in the given word. The new words must of course be true words. It is surprising how many words can be built up by young pupils in this way.

**Spelling Matches.** (1) The oral spelling match, as every one who has any personal knowledge of the matter, knows, is a most stimulating variety in the study of spelling. The competitive instinct is thus excited throughout the school, and sometimes throughout the community to which the school belongs. A written spelling match, though quite tame when compared with the oral spelling matches, is nevertheless very

effective if wisely conducted. Review lessons may be conducted with advantage in this way. Spelling matches should not come too often. They encroach too much upon regular work. When they do come, say once in two weeks, the conditions should be clearly understood, so as to avoid various evils. Disorderliness must be strictly excluded. (2) Ingenious teachers have hit upon more than one good way to conduct spelling matches. Among others the following are recommended :

*The Common Method.* In the common spelling match two persons of about equal ability are appointed by the teacher, or selected by the class, to be the "leaders," or "captains," of "sides." These captains come forward, and, after deciding which one is to have first choice, call up alternately the persons who are to take part in the contest. In this way the "sides" are formed on opposite sides of the room. When the lines have been formed, the teacher proceeds to assign the words to be spelled. He assigns the first word to the captain that had the first choice in choosing "sides." If the captain to whom the word was assigned misses, he is required to take his seat, *i.e.*, he is "spelled down." The other captain then takes his turn to spell the word that was missed. If he misses, he takes his seat, etc. The side that remains on the floor last, or that has more spellers left, at the close of the contest, is declared the winning side. The time to be allowed, or the list of words to be used, should be settled before the match begins. There are several obvious objections to this method of spelling.

*Saving and Out.* The common method can be converted into a better method by a variation in the process of spelling down. The plan is as follows : If A, and then his opponent B, misses a word, but C spells it, A is "saved" from taking his seat and only B is "out." In this way, two, three, and more persons, are sometimes saved to a side. The merits of

this method are evident. "Saving and out," is probably the best of all the methods for oral spelling matches.

*A Written Spelling Match.* Written spelling matches, when wisely conducted, are not as uninteresting as it is sometimes supposed. The choosing of sides can be managed as in oral spelling. The chief difficulty is to seat the spellers so as to keep those of the same side from helping each other. This difficulty is usually overcome by alternate seating, *i.e.*, by so arranging the spellers in seats as to separate those of one side by means of the spellers of the opposing side. When the number of words upon which it was agreed, has been spelled, slates, or books, may be exchanged, opponents correcting the words of opponents, and reporting the number of mistakes. All the spellers must be allowed to appeal to the teacher before the final results are announced. The side which, on adding up mistakes, is found to have missed the greater number of words, is declared "vanquished," or "defeated," or "lost."

There are four or five other methods of conducting spelling matches, but they hardly deserve recognition here. Ingenious teachers may invent plans to suit themselves, but the attempt to change plans too often is productive of misunderstandings, and should therefore be avoided. The teacher must in all cases see to it that quarrels and bitterness do not result from these competitive exercises in spelling.

#### IV. RELATIVE MERITS OF WRITTEN AND ORAL SPELLING.

The questions now confront us, What are the merits of written spelling and of oral spelling? Which of the two modes deserves to be cultivated rather than the other? Do both modes of spelling deserve equal respect? In order to answer these questions we must inquire into the advantages and disadvantages of each method.

**The Advantages of Written Spelling.** There are at least three important advantages in written spelling: (1) Writ-



ten spelling is more instructive than oral spelling ; (2) The mental discipline of written spelling is greater than that of oral spelling ; and (3) The practical necessity of written spelling is greater than that of oral spelling.

1. *Written spelling is more instructive than oral spelling.*

(1) The "after-images" of sight are generally more persistent than those of hearing. (See Psychology.) In written spelling the letters of a word, and their true order, are therefore impressed more indelibly. This result is illustrated in the fact that pupils whose sight is defective generally find it harder to master spelling, than those whose sight is perfect. The fact that deaf pupils learn to spell sooner than blind pupils, proves the rule.

(2) In written spelling the eye can dwell longer on the word just spelled, thus stimulating the habit of corrective comparisons, and producing vividness of sensation, the essential to persistent associations in memory. (See the sixth law of Mental Activity.) Words orally spelled are lost to the ear almost instantaneously. Thus we see that by reason of the greater corrective possibilities in written spelling, it is the better mode of studying spelling. This conclusion is illustrated in the well-known habit of writing a word to see how it looks when we are not sure that we have spelled it right orally. The conclusion is also confirmed by the fact that persons who learn to spell by eye can spell well orally and in composition, whereas those who can spell well orally often spell poorly in composition.

2. *The mental discipline of written spelling is greater than that of oral spelling.*

(1) In written spelling every pupil is required to spell every word. This is not true in oral spelling, except, perhaps, where the teacher is a master in his art.

(2) In written spelling the pupil is required to pay unflag-

ging attention. This discipline develops the power to persevere in a task to its end. There is no species of culture that surpasses this power of resolute attention. The pupil that learns to pay unflagging attention in the spelling class, is so many steps nearer to success in other studies and in life. Oral spelling, except in the hands of rare teachers, does not produce these effects on the pupil's will, and hence is morally inferior.

(3) It is in written spelling, as was pointed out, that records of misspelled words can be most systematically kept for reviews. While such records are partly possible in oral spelling, the procedure is less satisfactory.

### *3. The practical necessity of written spelling is greater than that of oral spelling.*

In the ordinary affairs of life we could almost dispense with oral spelling. It is different with written spelling; we need it almost every day and in the most varied interests. The ability to spell orally is not, as was pointed out, a sufficient guarantee that a person can spell correctly in writing letters, etc. Correct spelling in "writings," as it will be pointed out at the close of this chapter, is desirable both on its own account, and for other reasons.

**The Advantages of Oral Spelling.** There are at least three advantages in oral spelling: (1) Oral spelling is more convenient incidentally than written spelling; (2) Oral spelling is the natural supplement to written spelling; and (3) Oral spelling is more interesting than written spelling.

#### *1. Oral spelling is more convenient incidentally than written spelling.*

Pupils should be required to spell any suspicious word in any recitation of school. Elusive terms, and technical terms, can often be definitely placed in memory by simply spelling them a few times. It is generally more convenient to spell such words orally, though it must be conceded that

words which will slip again and again must be written to be mastered. This task may take longer, but as it is important, it should not be neglected.

2. *Oral spelling is the natural supplement to written spelling.*

In the cases of defective sight, so common in our days, resort to oral spelling is certainly justifiable as a supplement or substitute. It was also pointed out in the paragraph on "Preparation of Spelling Lessons," that the senses reinforce each other in the work of committing something to memory. In other words, if the pupil's eye is unreliable, his ear must be made to do something to help the eye.

3. *Oral spelling is more interesting than written spelling.*

(1) The competitive instinct is stimulated more successfully in oral than in written spelling.

(2) In oral spelling pupils should be required to stand ; this requirement relieves the monotony of sitting still in the seats, and thus pleases pupils.

(3) Oral spelling is itself a pleasure to pupils ; it is an opportunity to use their vocal organs, an opportunity which most pupils welcome instinctively, especially if they are younger pupils. This interest in oral spelling deserves consideration. (See the Third Principle of Instruction.)

## V. PRINCIPLES OF INSTRUCTION.

The foregoing considerations lead us to several broad conclusions, which deserve to be adopted as principles of instruction in spelling.

1. The words which the pupil meets in the studies of his grade should be developed into a working vocabulary. The list of words to be spelled by pupils in elementary grades, should consist of words which these pupils meet in all the studies of those grades. The same rule should hold in grammar grades and higher grades. The teacher must see to

it that pupils not only learn to spell these words, but also to use them intelligently, whether it be in studying and reciting the various lessons of reading, history, geography, etc., or in writing letters, essays, etc. (See the Fourth Principle of Instruction.) This work may be combined with the lessons in reading, history, grammar, etc., or it may be done in special spelling lessons. If special recitations are set apart for such work, the list of words selected by the teacher may be written on the black-board where the class can see and study them.

2. The exact psychological complement and sufficient stimulus of oral spelling should be added to written spelling. (1) Since oral spelling is a substitute for written spelling in the case of pupils whose sight is defective, or a complement in the formation of persistent associations, it follows that the teacher should study his class, and then adjust the proportion of written and oral spelling to the needs of the class. (2) Since the competitive instinct can be utilized to better advantage in oral than in written spelling, there ought to be oral spelling in those cases where it is advantageous, *i.e.*, in reading classes, in other branches, and as special lessons with younger pupils.

3. The "spelling-book" should be used as much as proper "stress" and "economy" require. (1) The spelling-book has always emphasized the importance of spelling as a subject of study. Wherever it falls into disuse, teachers are likely to pay too little attention to spelling, and pupils fall into habits of careless spelling. (2) Economy requires that lists of words be mastered in spelling, even when the words cannot all be developed into a working vocabulary. (a) The mind of the pupil is ready for this task: associative memory, stimulated by the competitive instinct which is present in younger pupils, fits them to do the required work. (See the Eleventh Law of Mental Activity and the Sixth Principle of Instruction.) (b) There is a good deal of time on the hands

of younger pupils, which can be utilized in such lessons. (c) Moreover, wherever the spelling-book has been wisely used, the results have been gratifying.

#### VI. COURSE OF LESSONS.

It is evident from the principles of instruction in spelling, that the course of lessons should be as follows: (1) The vocabulary of the grade to which the pupil belongs should be mastered in spelling; and (2) there should be a parallel and supplementary course in the spelling-book.

**1. Vocabulary Lessons.** The pupil needs an ever-increasing vocabulary in order (1) that he may understand books, and (2) that he may express his thoughts. It is obvious that this list of words (the pupil's necessary vocabulary) is the list to be spelled before any other work in spelling is done.

**2. The Spelling-Book.** The present necessity of the pupil deserves the teacher's first attention; but, as pointed out on page 70, the future necessity of the pupil deserves attention, too. In other words, when pupils arrive at a certain stage in their progress, their working vocabulary needs to be increased so fast that, unless they have already learned to spell many of the words, they will not have time enough to master both spelling and meanings, and are therefore likely to neglect the spelling. To avoid this evil, the lists of a graded spelling-book are to be spelled somewhat in advance of the actual vocabulary need of the pupil.

#### VII. THE IMPORTANCE OF SPELLING.

There are very few subjects of study so seriously neglected as that of spelling. The importance of other studies is more obvious, and this pushes spelling into the background of our estimation. The following estimate of spelling seems fair: (1) The discipline of spelling has a moral and practical

radius ; and (2) good spelling is a desirable instrument in written communications, whether they be commercial, social, or literary and scientific.

**1. The Discipline of Spelling.** The habits and tastes cultivated in the efforts required to master spelling, assert themselves as habits and tastes in the moral and practical activities of pupils. In other words, the habits of attention, accuracy, and correction, which the pupil must cultivate in order to master spelling, will in time become habits and tastes in his other studies, and in his moral and practical dealings.

**2. The Desirability of Ability in Spelling.** (1) The young people that seek positions of trust and honor, must give evidence of character in most unexpected ways. A business man knows, when he reads the letter of an applicant for a position, whether he may safely employ the applicant or not. He knows this not only by observing the penmanship and individuality of the letter, but also by the spelling of the words used in the letter. (2) What is true of written intercourse with business men, is equally true of social letters, literary products, and scientific treatises. We think better of our correspondents when they spell well. We could not tolerate bad spelling in literature and scientific treatises. There is no reason why these ideals should not be respected in our school curriculum. (3) It is to be deplored, therefore, that spelling has fallen into such great neglect as facts at present show, and the evil should be corrected in all grades of our schools.

## CHAPTER VI.

## COMPOSITION.

THE purpose in hand requires reference to (1) The Nature of Composition, and (2) Instruction in Composition.

## A. THE NATURE OF COMPOSITION.

The nature of composition is conveniently treated under the following heads: (1) The Selection of a Subject; (2) The Cumulation of Materials; (3) The Plan of Construction; and (4) The Construction of a Composition.

**The Selection of a Subject.** In the ultimate sense, composition, as the origin of the word denotes, is not cumulation, but construction. If composition were only cumulation, and not also construction, any collection of materials would serve the purpose as well as any other. The supreme concern would then be to fill up space. If, as indicated, composition is construction, the selection of a subject must be the first task. The selection of a subject in composition determines what materials ought to be accumulated, and what plan of construction is most appropriate, just as in architecture the species of building to be erected determines these matters. The materials and plan that will do for a story, for example, will not do at all for a thesis, just as the materials and plan for a cottage will not do for a fortress.

**The Cumulation of Materials.** In architecture the two important considerations are (1) the plan of the house, and (2) the material resources. The man of means need not count the costs beforehand, when he is about to build a house. For him it is possible to plan the house to suit his taste, and to let

the costs be what they will. But the man of limited means should first examine his bank account, and then plan his house within his means. In composition, as in architecture, the two important considerations after selecting a subject, are (1) the plan of construction, and (2) the material resources. The man of large mental resources need not count the costs beforehand, when he is about to write a composition. For him it is possible to plan the construction according to the ends in view, regardless of the mental costs. But the man of limited mental means should first ascertain his resources, and then plan his composition.

If the materials are collected before the plan of construction is matured, a tentative plan should be followed in the collection. In that event, it is true, the supply may exceed the demand of the ultimate plan; but this is infinitely better than poverty in supply. Indeed, the supply of materials should be much greater than the demand. In that event critical selection of materials becomes possible, and this is a most desirable possibility.

**The Plan of Construction.** When the collection of materials has been accomplished, the tentative plan of structure should be developed into an ultimate plan. The plan of a composition is commonly termed *Outline*, or *Synopsis*. A synopsis in composition is a "draught" for the composer. It represents the phases of the subject, and therefore serves as a frame or skeleton for the collected materials. The composer simply covers this frame, or clothes the skeleton, with suitable materials, and thus completes the structure. In order that a synopsis may serve its purpose, it must be specific, *i.e.*, it must be designed for the particular species of composition to be constructed.

*Species of Composition.* The species of composition are as follows: (1) Description, (2) Narration, (3) Letters, (4) Essays, (5) Orations, and (6) Poems.



(1) A composition devoted to the qualities of an object, person, scene, or phenomenon, is termed a *Description*. (2) A composition concerned with events, whether they be fictitious or true, is termed a *Narration*. Tales, stories, anecdotes, biography, history, novels, etc., are species of narration. (3) A *Letter* is a written communication from one person to another. The species of letters are didactic, news, official, commercial, introductory, etc. (4) A brief composition devoted to the expression of opinions on important subjects, is termed an *Essay*. Editorials, reviews, etc., are common examples of essays. A *Thesis* is a lengthy and logical essay on some dignified subject. A text-book is a thesis. (5) A composition intended for hearers, is termed an *Oration*. Speeches, addresses, lectures, sermons, etc., are species of oration. (6) A metrical composition constructed to please the taste, is termed a *Poem*. Hymns are poems.

The skeleton of a description should promote organic sequence in construction; that of narration, chronological sequence; and that of essays or orations, syllogistic sequence. The following outlines are illustrations of these requirements.

## A THERMOMETER. (*Description.*)

### INTRODUCTION.

1. VARIATIONS IN TEMPERATURE.
2. THE NEED OF EXACT MEASUREMENT OF TEMPERATURE.

### THE INVENTION OF THE THERMOMETER.

1. IT HAD LONG BEEN NOTICED THAT BODIES EXPAND AND SHRINK.
2. THIS SUGGESTED THE POSSIBILITY OF CONSTRUCTING A THERMOMETER.

# THE CONSTRUCTION OF THE THERMOMETER.

1. A HOLLOW TUBE WITH BULB IS NEEDED.
2. THE BULB IS FILLED WITH MERCURY.
3. A VACUUM IS LEFT ABOVE.
4. HOW THE MEASURING IS DONE.
  1. *The tube is fixed in a marked plate.*
  2. *The degrees are counted upwards.*
5. HOW THE SCALE IS MADE.
  1. *The tube is immersed in melting ice for the freezing-point.*
  2. *Plunged into steam for the boiling-point.*
  3. *The intervening space is divided into equal spaces.*

# CONCLUSION : ITS USES.

1. TO COMPARE THE HEAT OF DIFFERENT CLIMATES.
2. IN THE ARTS.

# FIVE YEARS' EXPERIENCE WITH A SUNDAY-SCHOOL CLASS.

(*Clark's Practical Rhetoric.*) (*Narration.*)

# INTRODUCTION.

## MY HESITATION ABOUT TAKING THE CLASS, AND THE FIRST SABBATH.

# THE CLASS.

1. ORIGINAL MEMBERS.
2. CHANGES.

# THE PUPILS.

1. PERSONAL APPEARANCE.
2. CHARACTERS.
3. HOME SURROUNDINGS.

## THE WORK.

1. DIFFICULTIES.
2. WILLINGNESS OF THE CHILDREN TO LEARN.
3. NEW PERPLEXITIES.
4. ONE BENEFIT.

## MEMORIES.

1. THE SUNDAY-SCHOOL HOUR.
2. CONFIDENCE AND GOOD-WILL OF THE CHILDREN.
3. A DEATH-BED.
4. A CHRISTMAS MORNING.

## SCHOLARS AT PRESENT, AND A THOUGHT ABOUT THE FUTURE.

## CONCLUSION.

WILLIAM SHAKESPEARE. (*Biography.*)

## INTRODUCTION.

1. THE RARITY OF MASTERS IN LITERATURE.
2. REFERENCE TO SEVERAL MASTERS.

## THE CIRCUMSTANCES OF SHAKESPEARE'S BIRTH.

1. DATE.
  1. *Character of the Times.*
2. PLACE.
3. PARENTS.

## CHILDHOOD AND YOUTH.

1. OPPORTUNITIES.
2. HABITS.
3. INCIDENTS AND ANECDOTES.
4. CRISES.

174      PRINCIPLES AND METHODS OF TEACHING  
MANHOOD.

1. TALENTS.
2. OCCUPATION.
3. ACHIEVEMENTS.
4. CRITICAL ESTIMATES.
  1. *Shakespeare's character.*
  2. *Shakespeare's works.*
  3. *Shakespeare's enduring fame.*

CONCLUSION.

1. DEATH.
  1. *Obsequies.*
  2. *Resting place.*
  3. *Reflections.*

HABITS. (*Essay.*)

INTRODUCTION.

1. *Interesting anecdotes.*

WHAT IS A HABIT?

HOW DOES ANYTHING BECOME A HABIT?      EXAMPLES.

WHAT HABITS ARE POSSIBLE?

1. *A very important possibility.*

WHAT HABITS SHOULD WE CULTIVATE?

1. *The governing considerations.*
2. *Good habits enumerated and defined.*
3. *The worth of good habits.*

THE PERSISTENCY OF HABITS.      EXAMPLES.

1. *How to destroy bad habits.      Anecdotes.*
2. *The curse of evil habits.*

CONCLUSION.

1. *How careful we should be in forming habits.*

WILL. (*Thesis.*)

## INTRODUCTION.

1. THE ABILITY TO GOVERN OURSELVES IS TERMED WILL.
2. ANY EXERCISE OF THIS ABILITY IS TERMED WILLING, OR VOLITION.

## THE NATURE OF WILL.

1. MOTIVES. The influences that enter, but do not irresistibly determine, a voluntary struggle, are termed *Motives*.
2. DECISION. The voluntary selection of an alternative, after comparing it with others, is termed *Decision*.
  1. *Intention*. The voluntary selection of an alternative whose attainment is prospective, is termed *Intention*.
    - (1) Vigorous intention is termed *Purpose*.  
Examples.
    - (2) Invincible purpose is termed *Resolution*. Examples.
  2. *Attention*. The voluntary and uninterrupted selection of one alternative rather than others, is termed *Attention*.

## THE CULTIVATION OF WILL.

1. DEVELOPMENT OF NOBLE CONCEPTIONS AND FEELINGS.
2. VIGOROUS AND RESOLUTE ACTIVITY IN ALL TASKS.
3. THE PUPIL'S EFFORTS MUST BE STIMULATED, SUPERVISED, ASSISTED.

## CONCLUSION.

1. THE WORTH OF WILL.
2. THE IMPORTANCE OF ITS CULTURE.

## THE PROBABILITIES. (*Lecture.*)

### INTRODUCTION.

#### NOW ON THE WAY TO BE TEACHERS.

1. THE INFLUENCES HITHERTO AT WORK IN YOU.
2. THE DIFFERENCE OF PERSONAL ATTITUDE.
  1. *Ends in view.*
  2. *The "heart" in each attitude.*
  3. *Resolution, weak or strong.*

### THE PROBABILITIES.

1. THERE WILL BE WORK FOR YOU TO DO.
  1. *The demand for teachers.*
  2. *Prudent preparation, "Professional Training."*
2. WHETHER YOU WILL BE WORTHY OF SO NOBLE A CALLING, MUST DEPEND TO A GREAT EXTENT ON YOUR OWN EFFORTS.
  1. *Exercise is the price of culture.*
    1. In it must be a good head.
    2. In it must be a whole heart.
    3. In it must be a set purpose.
  2. *Study is the price of wisdom.*
    1. In it must be humility.
    2. In it must be constancy.
    3. In it must be vigor.
3. THE LIVES OF MANY WILL BE PUT INTO YOUR KEEP-  
ING FOR WEAL OR WOE. THUS IT APPEARS IM-  
PORTANT,
  1. *That you should understand your business.*
  2. *And that you should mind your business.*

### CONCLUSION.

**The Construction of a Composition.** "A mass of materials, however fine the quality, no more constitutes a composition than a pile of bricks and lumber constitutes a palace. The builder must select, fit, and join together the materials before there is a building." The parts of the frame, or skeleton, in composition, represent, as it has been explained, the phases of the subject, and determine what materials to use in completing the structure. Therefore, when the framework of the proposed composition has been erected, the collected thoughts must be arranged as required by the framework.

In order to obtain favor, a composition must be brought into connection with the occasion. This is generally accomplished by means of (1) reference to current events, (2) anecdotes, (3) striking statement of the propositions to be discussed, etc. The portion of the composition devoted to this purpose, is termed the *Introduction*. The portion of the composition that expresses the message to be expressed, is termed the *Body* of the composition. A composition should produce definite and desirable consequences in readers or hearers. This is generally accomplished by (1) a recapitulation of arguments, (2) an appeal to the feelings, etc. The portion of the composition devoted to this purpose, is termed the *Conclusion*. Thus it appears that the necessary parts of a formal composition are the *Introduction*, the *Body*, and the *Conclusion*. These requirements need not be insisted on in an informal composition.

**Mechanical Execution.** (1) If the composition occupies only one page, let us say a page of foolscap, the subject is to be written on the top line, between equal margins. The text is to begin on the third line, an inch or more from the margin of the page. After neatly folding the upper and the lower third of the page upon the middle third, the subject, the name of the writer, the date, etc., should be written crosswise upon the middle third. Taste in arrangement is very desirable. (2) If the composition

occupies a number of pages, as in the case of a thesis, the first page should be devoted to the statement of the subject, the name of the writer, the date, etc. Only one page of a sheet should be used. The synopsis, or skeleton, should be written on the third page. The subject of a composition, appropriately and interestingly stated, should be written on the first line of the fifth page. The following line should not be used. The Introduction should begin on the third line, with the usual margin of an inch or more. Headings of the sections of a chapter should be written across the page with one line unoccupied before and after them. (3) That which is said about each phase of the subject, as represented by the skeleton, is termed a *Paragraph*. Each paragraph is a composition in itself, and all the paragraphs taken together in their true order, constitute the composition-whole. The subject of each paragraph should be stated in appropriate words, and concisely. This statement, or heading, should be written on the first line of the paragraph, underscored, and separated from the first sentence by a period and considerable space. When no paragraph headings are used, as in subordinate paragraphs, the first line of the paragraph should begin an inch or more from the left margin of the page. A paragraph should never begin on the unfinished line of a preceding paragraph. The paragraphs should be as perfect as possible in the choice of words, correctness and effectiveness of sentences, figures of speech, punctuation, capitals, illustrations, quotations, etc.

**Finishing Touches.** Improproprieties and errors in a composition should be criticised and corrected.

**Criticism.** Errors and improprieties will creep into a composition, do what we may to keep them out. Among the defects that commonly creep into a composition are (1) the choice of inferior thoughts, (2) an inferior plan of structure, (3) defective junction of paragraphs, (4) weak illustrations and quotations, (5) poor taste in figures of speech, (6) faulty vocabu-



lary, (7) incorrect spelling, (8) poor penmanship, (9) faulty sentences, (10) defective punctuation, (11) errors in capitalization, (12) carelessness in details. These imperfections, whether they be matter or form, are injurious to the composition. The writer should therefore repeatedly revise his production, and the revision should be both critical and unsparing.

*Correction.* The author of a composition may be very conscientious in revision, and yet fail to perfect his composition. It requires years of discipline to become an adept in the business of composing. Until the composer has become a master in his art, supervision and assistance must be added to revision. In other words, a superior must point out imperfections and assist the writer in perfecting a composition.

## B. INSTRUCTION IN COMPOSITION.

The teacher of composition, as we must infer from the nature of the tasks in question, should understand (1) Supervision in Composition, (2) The Principles of Procedure, (3) The Courses of Lessons, and (4) The Importance of Composition.

**Supervision in Composition.** The teacher's supervision in composition, as we know from the tasks of the pupil, must extend over (1) The Selection of a Subject, (2) The Cumulation of Materials, (3) The Plan of Construction, (4) The Construction of the Composition, and (5) The Finish.

**Effective Selection of Subjects.** There are three governing considerations in the selection of subjects for compositions: (1) The subject should be suitable in itself; (2) The subject should be suited to the writer's present powers; and (3) The subject should be suited to the occasion.

**Effective Cumulation of Materials.** Among the governing considerations in collecting thoughts and language for a composition, are the following: (1) The method of cumulation should be consistent with the nature of the subject. Within the domain of experience, for example, observation is more

effective than reading. (2) The cumulation should be consistent with the composer's constructive powers. The young writer, for example, should not attempt to collect abstract and general thoughts. (3) The cumulation should be consistent with the purpose of the composition. The occasion, the intelligence of the reader or hearer, etc., must be considered in collecting materials of thought and language.

**Effective Planning of the Composition.** Among the governing considerations in the plan of a composition are the following: (1) The plan of construction should be consistent with the species of composition to be constructed. The plan of a story, for example, would not do for a thesis. (2) The plan of construction should be the most suitable framework for the materials to be employed in construction. It should be a guide in collecting materials and a skeleton for the composition to be constructed. (3) The tentative plan used in collecting materials should be critically revised until it becomes most effective. When it has become a habit to plan compositions, and to persevere in the efforts to find the best plan, great progress has been made toward mastery in composition.

**Effective Construction of the Composition.** Among the governing considerations, in writing out a composition, are the following: (1) A composition should be constructed in obedience to the plan of construction. Deviations should be attempted only for good reasons. (2) The collected materials of thought should be arranged in the most effective way. This requirement refers to the development of the paragraphs, the possible arrangements being either inductive or deductive, analytic, or synthetic. (3) The language of a composition should be choice and effective. This requirement refers to the selection of words, the structure of sentences, the figures of speech, the taste in mechanical execution, the punctuation, the capitals, etc. This is the domain of *STYLE*.

*Diction.* The selection and use of words, is termed *Dic-*

tion. The effective qualities of diction are (1) Purity, (2) Propriety, and (3) Precision. A word is pure when it is used by the best writers and speakers. A word is appropriate when it expresses the writer's meaning. A word is precise when it expresses the writer's meaning exactly.

*The Structure of Sentences.* The arrangement of the words, phrases, and clauses, of a sentence, is termed its Structure. The desirable qualities of a sentence are, (1) Concord, (2) Clearness, (3) Unity, (4) Energy, and (5) Harmony. A sentence has *Concord* when it does not violate the laws of grammar. A sentence has *Clearness* when its meaning cannot be mistaken. A sentence has *Unity* when its parts are closely related. A sentence has *Energy* when its words are so selected and placed as to convey the thought with force. A sentence has *Harmony* when its utterance is pleasant and suggestive to the ear.

*Figures of Speech.* Deviations from the ordinary modes of speech, are termed Figures of Speech. There are four species of figures: (1) Figures of Orthography, (2) Figures of Etymology, (3) Figures of Syntax, and (4) Figures of Rhetoric. Expressions in which the mode of thought is changed, are termed Figures of Rhetoric. Among the most desirable figures of rhetoric are Simile, Metaphor, and Personification. A *Simile* expresses the likeness of several objects, actions, or relations. Ex. "Reason is to faith as the eye to the telescope." A *Metaphor* implies the likeness of several objects, actions, or relations. Ex. "Her smile was the dawn of a radiant day." A *Personification* attributes life and mind to beings that are not persons. Ex. "The very stones of Rome will rise in mutiny." Figures of rhetoric, because of the grace and force which they add to discourse, should be studied and introduced with taste into composition. Reference to some treatise on Rhetoric will be necessary in this task of composition.

*Taste in Composition.* Appreciation of proprieties is termed Taste. Good taste is a respect for beauty, sublimity, pathos, and humor. Good taste in composition also respects mechanical adaptations, such as places on the page, the uses of spaces, etc.

*Punctuation and Capitals, etc.* No composition is complete unless its punctuation and capitals are correct. The details cannot be enumerated here. The instructor in composition must study these matters in some treatise on Rhetoric. The same holds true of instruction in Prosody.

**Effective Finish.** The removal of imperfections that were not noticed in writing out the composition, is termed Finish. It corresponds to the process denoted by the same name in the mechanical arts, such as architecture, sculpture, etc. Effective finish is the removal of all those crudities and blemishes that offend good taste.

**Principles of Instruction.** The principles of instruction, as stated in the chapter devoted to that purpose, are applicable to all branches of study. Several of them (the Second and Tenth) need to be emphasized in their application to composition. From the Second Principle of Instruction we derive the following modified form: The learner should be led to see how talking and writing are related. From the Tenth Principle of Instruction we derive the following modified forms: (1) Instruction in the art of language should precede instruction in the science of language; (2) The art of language should be perfected by the science of language; and (3) The courses of instruction in language should be graded from the simple to the complex.

1. *The learner should be led to see how talking and writing are related.* Children are inclined to think that composing is entirely different from talking, and far more difficult. This notion often causes them to dread composition, and to be unnatural in their attempts to compose. It is therefore quite important to correct all such notions. The pupils must be

made to see first of all that it is possible to *write* thoughts as well as to *talk* thoughts, and that writing and talking are somewhat equivalent as modes of expressing thoughts. This point cleared up, it becomes evident to pupils that composing is not an attempt to say what they do not know or cannot think, but just the opposite. The relation of talking and writing is best taught by requiring pupils to talk their thoughts before writing them, and to write them just as they would talk them.

2. *Instruction in the art of language should precede instruction in the science of language.* Unlettered people express their thoughts in speech and writing without thinking of parts of speech, rules of grammar, requirements of rhetoric, etc. Homer wrote the Iliad without a knowledge of these requirements. It is true enough, however, that such attempts are often crude and imperfect. The desire to improve language as a vehicle of thought, prompted inquiry into the structure of words, sentences, etc. And thus in time the laws of language were ascertained. In other words, the science of language was developed from the art of language. Thus it becomes evident that instruction in the art of language should precede instruction in the science of language. Indeed, this has become the governing principle in the construction of modern text-books on grammar, rhetoric, etc. The introductory courses in these branches are designed to develop imitative faculty in composition rather than critical insight.

3. *The art of language should be perfected by the science of language.* Imitative faculty in composition is an inestimable attainment, but critical insight is the necessary complement of imitative faculty. In other words, the composer who can justify his imitations and correct imperfections by reference to principles, is a superior workman. If, for example, a pupil should punctuate a sentence as he has seen it punctuated, and then give the reasons; or, if he can correct errors in sentences,

and give the reasons according to grammar and rhetoric, he is certainly more fortunate than a pupil who can only imitate sentences, etc., without knowing the reasons or the principles of language involved. It is evident, therefore, that a knowledge of grammar, rhetoric, etc., are indispensable to mastery in composition. Accordingly, the pupil should in due time be led to see these principles, and to govern himself by them. In short, the art of language should be perfected by the science of language.

4. *The courses of instruction in language should be graded from the simple to the complex.* According to the Tenth Principle of Instruction, introductory courses, as well as subsequent courses in any study, should require the learner to supplement his observations by induction and deduction. There are two governing considerations in the correct application of this principle: (1) The stages of mental development should be ascertained and respected. These stages of comparatively greater functional activity and aptitude are, (1) The perceptive stage, (2) The conceptive stage (memory, imagination, and generalization), and (3) The reflective stage (induction, deduction). The teacher should ascertain the particular mental epoch at which his pupil has arrived, and then adjust the tasks which he assigns. In the perceptive epoch, for example, the exercises in composition should not demand too much generalization, and very little reflection. In the conceptive epoch the tasks may become somewhat more abstract, and in the reflective epoch they should require inductive discovery of the principles of composition and deductive conformity, as well as logical reflection on the subject of composition. (2) There should be a progressive transition from simple to complex tasks in composition. It is not enough that the adjustments recognize perceptive, conceptive, and reflective epochs in composition, and the relative preponderance of one aptitude over others in each epoch. There must be a further adjustment within each

of these adjustments. The perceptive tasks, for example, must be easy at first, and then more and more difficult. The same prudence in assigning conceptive and reflective tasks is desirable. In short, the courses of instruction in composition should be graded from the simple to the complex. The following courses are designed to satisfy these needs.

### I. ELEMENTARY COURSE.

The tasks assigned to this course are intended for children between the ages of six and twelve. It will be observed that more perceptive activity is required at first, and then increasingly more conceptive effort, but only a minimum of reflective attention. (First Principle of Instruction.) The tasks are also more simple in themselves at first and more complex at last. (Tenth Principle of Instruction.) These elementary exercises need not come in the order here adopted, but should be gradually so combined that every subsequent composition will require the pupil to use all his previous attainments. It should be remembered that the Elementary Course, as also the Intermediate and Higher Courses, as here outlined, are only outlines, and that they need to be supplemented by the teacher in many ways.

1. *Writing the names of objects.* As soon as children can write they should be required to write the names of objects: the names of objects in the school-room; objects to be found on the school-grounds; objects observed on the way to school; objects observed at home, etc. There should be system in this exercise from the beginning. The names may be written in columns, or in series, as follows:

1. Paul.

2. mother.

3. eyes. Or: Paul, mother, eyes, slate, dog.

4. slate.

5. dog.

Proper care should be taken of neatness, spelling, numbers, periods, commas, capitals, etc., as the pupil can understand these matters. The pupil will need constant supervision.

2. *Writing the names of actions.* The pupil should be required to write the names of actions; the names of ten things that a frog, an owl, a bee, a mouse, a storm, or a cloud, have been observed to do. This should be done according to the directions that apply to writing the names of objects.

3. *Writing simple sentences.* The pupil should be required to write the names of objects joined to the names of their actions; as, Birds fly; The cat mews; A cloud moves. The name of the object may be given, and the pupil required to add the name of its action, or *vice versa*; as, A fish —; A — swims. The pupil should be taught to call these sentences *telling*, or Declarative, sentences. As soon as he knows how to write these short Declarative sentences, and has formed the habit of using the capital and period correctly, he should learn to write *asking*, or Interrogative sentences; *commanding*, or Imperative sentences; and *feeling*, or Exclamatory sentences. Special attention to the differences in punctuation is important. There should be plenty of practice and correction.

4. *Supplying ellipses in simple sentences.* The pupil should be required to supply the words wanted in such sentences as the following: Mabel lost — hat. — found my skates. The — rabbit was killed. Those cakes tasted —. Mary can — run —. May I go — you? John, be —. We saw Dora — on the door-step. At first the pupil should not know the words to be supplied as pronouns, adjectives, adverbs, prepositions, participles, etc., but only as words needed to complete the sentences. In due time the offices of the various parts of speech can be taught by means of such ellipses.

5. *Constructing simple sentences containing given words or phrases.* The pupil should be required to construct simple sentences containing given words or phrases. At first the sen-



tences should contain only one given word or phrase. The words or phrases to be used may be written on the black-board, and referred to the pupils. At first the pupil should construct the sentences orally, in order that he may see what is required of him in writing. When two or more words are to be used, the teacher must select very carefully, so as not to make the task too difficult at first. Phrases should not be introduced until the pupil has acquired considerable skill with words.

6. *Copying and imitating sentences containing capitals, abbreviations, and punctuation, etc.* When the pupil has acquired satisfactory skill in constructing simple sentences that require only final punctuation, and an occasional comma, he should be introduced to simple sentences that require a number of punctuation marks, abbreviations, and capitals. In due time complex, and finally compound sentences, should be studied, the mode of procedure being imitative.

The teacher may write suitable sentences on the black-board, explain the punctuation marks, capitals, abbreviations, etc., that occur, require the pupils to explain these matters as well as they can, and then to copy the sentences, first at sight, but afterwards from memory, until they can do so without awkwardness or blunder. The pupils should be required to imitate these copied sentences, *i.e.*, to write original sentences in which the punctuation, etc., is like that of the copied sentences. Parts of complex and compound sentences may also be given, and the pupils required to complete them; as, If Jane had not returned, ———. While ——— ——— the house burned down. “A wise son maketh a glad father; but ——— ——— ———.”

The tasks here proposed require the teacher to understand grammar and rhetoric. It is not maintained that these exercises should be continued in an unbroken series until the whole ground has been covered, but only that such a course ought to

be finished in due time and according to circumstances. The more difficult lessons in punctuation, quotation, abbreviation, etc., should evidently be deferred until grammar and rhetoric are taken up in the regular way. The teacher should see to it that the tasks which he assigns at this stage in composition necessitate perceptive and recollective attention, and concrete judgment, but not much reflective effort, and very little original effort.

7. *Copying and correcting poems.* While pupils are studying punctuation, abbreviation, quotation, and capitals, as indicated, they should also copy and correct poems. At first suitable poems should be copied from books put into the pupil's hand. Afterwards the teacher should dictate concrete poems, and require the children to copy these, taking care to get the lines, capitals, marks, etc., right. When these exercises have become easy, poems whose punctuation marks, capitals, etc., are incorrect, should be corrected by the pupils. Such accounts of corrections as the pupils can give should be required, and the teacher should tolerate no guessing. In due time the more conspicuous distinctions between prose and poetry should be studied ; but technical distinctions and abstractions should be reserved for the rhetoric class.

8. *Committing and reciting choice selections of prose and poetry.* In all the grades of our schools, the pupils should be required to commit and recite choice selections of prose and poetry. Only such extracts as, by reason of their literary and moral excellence, deserve to become permanent mental possessions, should be committed by the pupils. The teacher should not allow these extracts to be recited in parrot fashion, but thoughtfully. This thoughtfulness will become a habit, if questions must be answered by the pupil in connection with the recitations. The practice here advocated "will cultivate a literary taste, which lies at the basis of all artistic excellence in the use of language."

9. *Constructing original sentences containing capitals, punctuations, abbreviations, quotations, etc.* The exercises described in the foregoing paragraphs, required very little original thinking. In connection with these imitative lessons, corresponding original tasks should be assigned. These original tasks should increase in difficulty with the increasing maturity of the pupil. As in the imitative lessons, and parallel with the stages of their difficulty, so in these original tasks, the sentences should at first be only simple in species; but all the varieties of punctuation, etc., should be cultivated. The pupils should be led to see how a number of separate, but related sentences, can be reduced to one sentence, either simple, complex, or compound. When the pupils have observed the teacher doing so, they may be required to do the same with analogous sentences, orally at first, and then in writing. When it seems the right time to cultivate originality in complex and compound sentences, the teacher should take great pains to lead the pupils to see what is wanted. Moreover, it is of the utmost importance to secure the interest of the pupils. Patient practice in constructing original sentences, simple, complex, and compound, is the indispensable preparatory course in composition.

10. *Writing simple letters.* Long before the preceding exercises can be required in full, probably as soon as pupils have acquired considerable skill in constructing simple sentences, simple letters should be written. The teacher should first lead the child to see what a letter is. This can be done by writing illustrative letters on the blackboard, and explaining the parts. The letters of children, as published in educational periodicals and elsewhere, may also be read to them and inspected by them. When properly supervised, pupils will soon become quite skillful in writing accounts of personal experience, descriptions of visits, etc. They should be encouraged to write to their relatives and friends, expressing their thoughts just as they would if they were conversing with them face to face. The arrange-

ment of the letter, the construction of sentences, the punctuation, the spelling, etc., should be as perfect as possible. The corrected letters should be copied and preserved in a book.

11. *Describing objects.* Pupils should be required to observe some object critically, and then to describe it truthfully. Sometimes children cannot think of all that they know about something. By means of appropriate questions, the child may be led to think of his knowledge, and to discover more than he could find out unaided. Children should also be required to describe absent objects, or phenomena, such as a meadow, a sunset, a wagon, a chestnut tree, a rabbit, etc. These exercises develop accuracy and vigor in descriptive composition; and, in helping to establish the habit of critical observation, they equip the pupil for subsequent investigations. Attention to the thoughts to be expressed often causes the novice in composition to forget the requirements of grammar, rhetoric, and penmanship, etc. Such carelessness should not be tolerated at any time.

12. *Describing actions.* Pupils should be required to observe actions critically, and then to describe them truthfully. The actions of a child, the movements of a horse, the performance of a trick, the confusions of an accident, etc., are suitable subjects. Properly supervised, children will not only enjoy these exercises, but acquire great ability in such description. Appropriate questions are as important in these tasks as in the description of objects. It may also be required of pupils at this stage to write newspaper paragraphs. In order to show the pupils what is wanted, the teacher may bring a newspaper to school and read such paragraphs as will interest them, and then require them to write little items in imitation of those in the paper. In due time descriptions of current events should follow. Accounts of floods, fires, storms, parades, conventions, elections, inventions, discoveries, etc., are appropriate for older pupils.

13. *Describing pictures and basing stories on pictures.* A picture, as it is well known, appeals not only to the eye, but also to the imagination of children. Pictures are accordingly of great value in language lessons. The pupils should be required to observe a picture critically, and then to tell what may be seen. Sometimes it may be necessary to ask questions in order to lead the observer to find what is to be found. Inasmuch as pictures appeal to the imagination, they may be employed to suggest stories. The children will readily invent such stories provided the teacher starts the process and preserves the thread by means of skilful questions and suggestions. Appropriate pictures may be found in school-books, or brought by teacher and pupils. The teacher should see to it that only such pictures are used as are æsthetically and morally fit.

14. *Writing anecdotes and narratives.* There is magic in anecdotes and narratives. The young mind loves them; the old mind lives in them. The power to relate anecdotes and to tell stories, is a most effective equipment in teaching language lessons. There are three stages to observe in teaching anecdotes and stories: (1) At first the teacher should relate the anecdote or tell the story, the pupils listening attentively all through the procedure. Then the pupil, assisted by questions, if that be necessary, should repeat the *substance* of the anecdote or story, orally at first, and then in writing. (2) Anecdotes and stories may be told in short sentences, either orally or in writing. When the teacher has thus put the pupils on the track, they should be required to expand these short sentences, supplying what seems necessary to complete the structure. (3) To older pupils only an outline should be submitted, and they should be required to construct the story themselves. This last task is quite difficult, inasmuch as it requires conceptive and inventive effort; but the exercise brings excellent results.

*Note.* The incomparable stories of Grimm, Hans Christian

Andersen, and other writers of stories for children, should be studied by teachers, in order to imbibe the inspiration that ought to belong to this species of instruction.

## II. INTERMEDIATE COURSE.

(1) In the Elementary Course the stress was laid on perceptive and recollective efforts. The conceptions required in that course were concrete. Inventive and reflective efforts, required within limits, were attentively supervised and greatly assisted. (2) The Intermediate Course continues to require the efforts of the Elementary Course, but introduces abstract activity, and lays stress on reflective and inventive efforts. Less assistance is offered to the pupil, and he is required to depend a great deal upon his own resources. There is a transition from advisory to corrective and critical supervision. The course is intended for pupils between twelve and eighteen years of age. In graded schools, the Intermediate Course should be completed sooner.

1. *Writing the substance of reading lessons.* It is an excellent plan to require pupils to write the substance of their reading lessons. This task may be required as a preparation for intellectual reading, or as a direct exercise in composition at stated times, say once or twice a week. There are several merits in the exercise here advocated: (1) It promotes intellectuality in reading; and (2) It renders the transition from the concrete to the abstract in composition easier. The second result follows for three reasons: (a) The reading lesson furnishes thoughts for composition; (b) It furnished language; and (c) It furnishes thread or plan for the composition.

2. *Writing the recitations in geography, history, observation lessons, etc.* Sometimes, if the class be small, the pupils may be required to write instead of talk their recitations in geography, history, etc. If the class be large, some members may write their recitations while others recite orally. Apart from,

and in addition to, its direct benefit to geography, history, etc., this practice is an excellent exercise in composition. It requires reflective as well as perceptive and recollective attention; it cultivates conceptive ability in composition; and it tends to develop the habit of expressing thoughts in classical language. Remissness in spelling, punctuation, capitals, apostrophes, etc., ought by no means to be tolerated.

3. *Synopsis of lessons in reading, geography, history, etc.* Anatomically considered, a lesson is body and soul, as a man is body and soul. The body in both cases is the soul's means of revelation. It is an excellent exercise to discover the *skeleton* of this body in lessons assigned to pupils. It is through analysis that this discovery must be made. As soon as a pupil becomes able to analyze his lessons in reading, history, etc., into their skeletons, he is prepared to plan skeletons of his own for compositions of his own. He will then also understand and appreciate synopses. Teachers should therefore require pupils to analyze their lessons until the ability to do so develops into habit and inventive tendency. These synopses should be written on paper, slate, or board, and then criticised and improved.

4. *Writing all sorts of letters.* When the pupil has arrived at a proper age, he should be required to write all sorts of letters. The species of letters to be cultivated in the common schools are as follows: (1) Letters of Friendship, (2) Letters of Business, (3) Official Letters, (4) Didactic Letters, (5) Letters of Introduction, (6) News Letters, (7) Notes of Invitation and Acceptance, (8) Excuses, (9) Applications. To this list might be added Legal Papers, such as Promissory Notes, Due Bills, Checks, etc.

Models should be studied, and imitated with intelligence. The parts of a letter should be understood in all their varieties and proprieties. It is to be deplored that so many boys and girls cannot write neat and sensible letters when they quit

school. It should be considered discreditable to teachers if they fail to train their proteges in these matters. The first necessity in performing this duty is to study some standard author on letter writing. The teacher who fails to do this cannot do good work. Westlake's little book on "How to Write Letters," or, Hill's "Elements of Rhetoric and Composition," is recommended.

5. *Converting poetry into prose, and proverbs into essays.* The poets give us great thoughts in "verse." Philosophers condense the wisdom of the world into concise sentences termed proverbs. (1) For pupils whose ability to reflect has been sufficiently matured, the effort to convert verse into prose is a most effective exercise in composition. In this exercise the poet's thoughts and words become the pupil's thoughts and words, but the structure of prose is required to be original. The literary taste thus developed becomes original tendency and habit in the pupils. (2) The effort to expand a proverb into an essay is a very excellent exercise in abstract and reflective composition. It requires keen analysis to pierce to the core of many proverbs, and constructive effort, abstract and reflective, to expand them into essays. Thus it follows that the practice of converting poetry into prose, and proverbs into essays, develops that comprehensive understanding which is so much to be coveted in mature compositions. Teachers should therefore collect and grade appropriate poems and proverbs for the purposes indicated.

6. *Elementary lessons in diction, sentence-qualities, and figures of rhetoric.* A regular training in rhetoric may be out of the question for many common schools; but older boys and girls should certainly know the desirable qualities of vocabulary and sentences, and the common figures of rhetoric. The following exercises are recommended: (1) The pupils should be required to observe illustrative sentences, in order to discover how the desirable qualities of vocabulary and sentences are secured,



and in order to see the force of rhetorical figures. (2) The pupils should be required to commit such representative sentences as will subsequently serve for models. (3) The pupils should be required to construct sentences in imitation of those which have been studied as models. (4) Original sentences should be criticised and corrected. Reference to dictionaries and rhetorics will be necessary. The teacher should understand his business.

7. *Original Exercises.* A time should come when pupils should depend almost altogether on their own resources in composition. (Eighth Principle of Instruction.) Adequate supervision must, however, prepare for this emancipation in composition. In other words, pupils in original composition need a teacher's instructions and suggestions in the following tasks: (1) The Selection of Subjects; (2) The Cumulation of Materials; (3) The Acquisition of Vocabulary; (4) The Acquisition of Style; (5) The Plan of Construction; (6) The Construction of the Composition; and (7) The Finish. The teacher's duties and the right modes of procedure, are as follows:

(1) *The Selection of Subjects.* The governing considerations in the selection of subjects have already been noticed. (See page 179.) It is evident that only mature minds can select subjects in accordance with these requirements. Therefore it devolves on the teacher to select subjects for young pupils. If young pupils are allowed to select subjects for composition, the following results are likely: (1) Impropriety of choice; (2) Waste of time by embarrassment; and (3) Plagiarism.

On the other hand, if pupils are not required to rely on their own best judgment in selecting subjects, their individuality will be sacrificed. This result must be avoided. In order to avoid this sacrifice, several appropriate subjects should be selected by the teacher and proposed to the class. The teacher should ask questions and converse with the pupils on

these subjects, until they can choose for themselves. Two points are thus gained : (1) The pupil's independence is not sacrificed, but his individuality is cultivated. (2) Interest in the chosen subject is stimulated, and the pupil will perform his task with energy and purpose.

In due time, of course, the pupil should be required to select his own subjects in accordance with the governing considerations. But even mature pupils may be required to write on subjects assigned by the teacher, especially in cases when the compositions are to be considered as evidence of proficiency in some department of study. Graduating theses are illustrations. In such cases the students should be required to select subjects, hand them in according to appointment, and accept the approval of the teacher. The propriety of this course is obvious : (1) Desirable variety of subjects is secured ; (2) The liability of plagiarism is lessened ; and (3) The individuality of the pupil is guarded against possible caprice.

Pupils should be taught to state the subject of a composition in the most fitting words. Conciseness and precision should be cultivated. Though attractiveness of statement is effective, it should never be attempted at the sacrifice of true dignity and simplicity.

The ability to adjust subjects to the present powers of the pupil, is to be greatly coveted by the teacher. On his success in this task, will depend the degree of interest in composition and his consequent success as a teacher of composition. The teacher that fails in the task of supervising the selection of subjects, will make his pupils hate composition. This hatred is generally fatal.

(2) *Cumulation of Materials.* The governing considerations in the cumulation of ideas, thoughts, sentiments, etc., have already been noticed. (See page 179). It devolves on the teacher to cultivate obedience to these requirements on the part of the pupils. The possible modes of cumulating mate-

rials for composition are as follows : (1) Observation, (2) Conversation, (3) Reading, (4) Imagination, and (5) Reflection.

Within the domain of the pupil's past and possible experience, the teacher must insist on *Observation* as the first source of ideas. The experiences of others may be ascertained by *Conversation* ; or, if that be impracticable, by *Reading*. The habit of *Imagining* personages, places, events, experiences, possibilities, etc., should be cultivated in pupils. It was this habit of giving "to airy nothings a local habitation and a name," that made Shakespeare and Dickens such charming writers. Pupils should, however, be taught to *Reflect* as well as to observe, converse, read, and imagine. The habit of forming opinions should be encouraged. The ability to discover causes, laws, and effects, should be developed in older pupils. Taste for science and philosophy should be stimulated in capable students as soon as they become mature enough. Comprehensive scholarship, maturity of thought, and refinement in taste, are proper ideals in adult composers.

(3) *The Acquisition of Vocabulary*. The first necessity in composition is "something to say" ; but it is through language that this something must be said. Therefore it is necessary to acquire a vocabulary and the ability to construct suitable sentences. There are various ways of increasing and improving one's vocabulary. Among others are the following : (1) Association, (2) Lists of Words, (3) Use of the Dictionary, (4) Reading, (5) Translating, and (6) Choice of Words.

The words used by *associates* tend to cling to memory, as burrs cling to a dress. This is especially true of children, who often surprise us by their use of words "just picked up anywhere." Indeed, it is possible for a child to learn to converse in several languages before it comes to school at all, provided it has the opportunity to hear these languages and use them. The child whose teacher and other associates use a

large and choice vocabulary will acquire this vocabulary as if by instinct. It is a serious misfortune to associate with people who are careless in speaking, or to attend a school whose teacher cannot talk.

It is a good plan to make and keep a *list of the new words* met in lessons, general reading, conversation, speeches, etc. This habit should be formed in early youth, and kept up through life. The words thus catalogued and looked up in the dictionary, should be used in speaking and composing. Frequent review will keep these words at the end of our fingers and tongue. In this way our vocabulary, which is much smaller than most people suspect, can be greatly increased and permanently improved.

It is to be deplored that so many pupils neglect to look for the meanings and uses, as well as the pronunciation, of the words which they meet in their books and elsewhere, and it is even more deplorable that so many teachers do not insist on this habit both in themselves and in their pupils. If it be within his means, every student should own some *standard dictionary*, and make it his constant companion in study. "This was the habit of some of the most accomplished scholars and writers. Charles Sumner was a most assiduous student of the dictionary. He had several copies in his library in constant use, and usually carried a pocket edition with him; and they were found, after his death, to be the most thumbed of any of his books. Lord Chatham went twice through the largest English dictionary, studying the meaning of each word and its various uses."

In order to acquire a precise and copious vocabulary, the student must *read the masters* in English literature, such as Addison, Washington Irving, Tennyson, etc. These masters put meanings into words and phrases, whose delicate shades the ordinary mind would never even suspect. The disciple of such masters cannot but improve at their feet.

Apart from the fact that *translating foreign languages*, especially the classic Greek and Latin, tends to make students idealists, it increases and improves their English vocabulary. The translator must consult a lexicon in order to find the corresponding English words into which a foreign word may be translated, and then, from a number of alternatives, he must select that English word which will best express the meaning of the foreign word. It is in this way that his English vocabulary increases and improves, even if he should in a short time forget all the foreign words.

The pupil should be taught to *prefer short words to long words*. It is not a literary sin to use long words when short words cannot be found or when these do not express the intended meanings; but the impression that long words indicate profundity of mind, is a delusion which the teacher should dispel as soon as possible. There should be a severe simplicity in our choice of words. The Anglo-Saxon vocabulary, of which the English Bible, as well as "Pilgrim's Progress" and "Robinson Crusoe," are good examples, is far more expressive, and far less cumbersome, than the corresponding words derived from foreign languages.

(4) *The Acquisition of Style*. A large and expressive vocabulary is a most desirable acquisition, but it must be supplemented by the ability to construct sentences according to the rules of grammar and rhetoric. There are various ways of acquiring an effective English style. The following practices are recommended: (1) General reading, (2) Copying the sentences of the Masters, (3) Committing choice extracts of prose and poetry; and (4) Declaiming choice selections.

Pupils who *read* a great deal are usually better composers than other pupils, however bright the latter may be. The practice of *copying* sentences makes their structure familiar and in time impresses the style on the one who copies them. The practice of *committing* is still more impressive, inasmuch

as the amount of effort is greater in committing than in copying. The old practice of *declaiming* on Friday afternoons is a good practice. The prospect of an audience, and the desire to deserve praise, stimulate an intensity in committing selections, that will impress them deeply.

(5) *The Plan of Construction.* The governing considerations in planning a composition have already been noticed. (See page 180.) It is the teacher's duty to lead the way in this task of his pupils, as well as in other tasks. The importance of outlines should be pointed out, and the habit of making them should be developed in pupils in due time. The formation of outlines is a very awkward business at first; but, if wisely superintended, it soon becomes a pleasure. The teacher can do the following things: (1) He can teach the pupils how to ask themselves questions on some subject, such as Frogs, or Stars. (2) He can teach the pupils how to convert these questions into an outline. (3) He can write out a composition according to outline, while the pupils observe him. In this way they will see what use to make of an outline. (4) He can revise outlines formed by the pupils, showing them where they went wrong, and how to avoid the mistake in the future.

There should be a great deal of practice in the formation of outlines. An outline lesson may sometimes take the place of a composition, the pupils being required to construct the outlines on the board, slates, or paper, and corrections following according to the teacher's judgment.

(6) *Writing the Composition.* The form-features in the structure of a composition were described on page 177. It devolves on the teacher to insist on these matters. The pupils should be led to see just what is wanted, and also the importance of strictness in these form-features of a composition. Carelessness in the mechanical execution of a composition is not only an offense to good taste; it also renders the completed structure an imperfect vehicle of thought.

The teacher should try to develop in his pupils the habit of writing at times and under circumstances that are most appropriate to the task of writing. The habit of "brooding over" a subject until thoughts come and flow, should be encouraged. The writer should be taught how, by means of questions put to himself, he may work himself into the mood to write, and he should be encouraged to take true pride in the power to say things worth saying. Pupils should be led to see how important it is to write a composition over again and again until it becomes as concise and precise as it should be, and until the various requirements of grammar, rhetoric, and logic, have been met. Young writers are loth to destroy their first products, fondly believing that it will break their heart to give up anything they have said. This delusion must be corrected.

(7) *Correction.* The necessity of corrective supervision over pupils in composition, was noticed on page 179. The imperfections in the compositions of beginners should be corrected by the teacher himself. The corrections should be explained to pupils, care being taken not to discourage the writers. The compositions should then be read by the pupils, and copied in a suitable book for future reference.

In the case of older pupils the teacher should adopt a system of abbreviations by which to indicate necessary corrections. The pupils should understand these abbreviations, or symbols, thoroughly, and make the corrections accordingly. The corrected compositions should be read by the writer, at such time as the teacher may appoint, after which they should be copied in a suitable book for future reference. The preservation of compositions will develop the habit of comparing former and later products, thus serving as a stimulus to better efforts. The day on which the compositions are read should be a frequent and welcome day in every school. The inventive teacher will throw great interest into the exercises of "Composition Day," converting dull routine into a literary feast. The exercises of

“Composition Day” may include all the exercises of a good literary society, the pupils being members and officers.

### III. HIGHER COURSE.

In this course the student is required to aim at perfection in his art. He must try to find subjects that have something characteristic in them, and develop them in harmony with the principles of thought and language. He must try to appropriate the inspirations of the Masters in literature, but develop his own individuality to the utmost. Every composition must be subjected to scientific criticism. (Hill’s “Elements of Rhetoric and Composition,” pages 135 to 160.) It is the function of such a course to develop authors, journalists, teachers of literature, ministers, lecturers, etc.

The requisites of higher composition are as follows: (1) Criticism of the Masterpieces of English literature; (2) Inquiry into the relations of thought and language; (3) The application of principles of the relations of thought and language; and (4) Criticism of original compositions.

### IV. IMPORTANCE OF COMPOSITION.

The art of composition deserves the most earnest cultivation. The results of practice in composition are as follows: (1) The Functional Improvement of the Mind; (2) Increase of Knowledge; and (3) Practical Equipment.

**Functional Improvement of the Mind.** The selection of subjects, the accumulation of materials, the invention of plan of construction, the completion of the structure, the critical revision, the correction, etc., require all the possible species of mental activity. (See “Mental Activity.”) All the ends of mental development may be attained in composition; namely, (1) Greater functional activity; (2) Greater functional power; (3) Right habits; and (4) Correct tastes.



**Increase of Knowledge.** In composition there must be "something to say" and language with which to say it. The acquisition of ideas, thoughts, vocabulary, style, etc., is therefore a necessity. Thus practice in composition necessitates increase in knowledge. The knowledge acquired is derived from all the domains of thought, according to the supervision of the teacher, or the preference of the pupil.

**Practical Equipment.** Skill in composition is a valuable equipment in the affairs of life. The ability to write a letter is a commercial advantage and a social accomplishment. Indeed, the master in composition is able to live by his art, and is a prince among men. Journalism, authorship, etc., are among the most powerful agencies in modern civilization.

## CHAPTER VII.

## GRAMMAR.

THE true object of instruction is to cause right mental processes in pupils. (See the Principles of Instruction.) It is obvious that, in order to cause the right mental processes in teaching any branch of study, the teacher must know those processes. Therefore, the pedagogics of grammar is concerned with two general topics: (1) The Nature of Grammar; and (2) Instruction in Grammar.

## A. THE NATURE OF GRAMMAR.

The nature of grammar is most conveniently studied under three heads: (1) The Subject of Grammar; (2) The Psychology of Grammar; and (3) The History of Grammar.

## I. THE "SUBJECT" OF GRAMMAR.

In the sense in which physiology is the study of the body, grammar is the study of "words in sentences."

**Words in Sentences.** It is not with isolated words, but with words as parts of sentences that grammar is concerned. Differences of function and relation require variations in the spelling and placing of words. Therefore, inquiry into these differences of function and relation, is the essential to insight into the formation of sentences, which insight is the ultimate object of grammar. Thus we see that, although grammar must encroach upon the domain of orthography, and rise into the sphere of prosody, its special territory is a limited domain in etymology, enriched by syntax.

*Orthography.* Grammar consists of only so much orthography as is required in the interest of forming sentences. When, for example, the time to which the thought of a sen-

tence is referred, is *past*, the distinction is denoted by a variation in the spelling of the predicate.

*Etymology.* In its widest sense etymology is concerned not only with the functions of words, but also with their history. But grammar is etymology only in so far as it is concerned with the functions, properties, and relations of words *in sentences*.

*Syntax.* The etymology of which grammar consists is enriched by the fact that words are parts of sentences. This distinction, indeed, is the justification of grammar as a special study. Take, for example, the sentence, "The handsome man that rode in the king's chariot, was slain by a woman." In this sentence the function, several properties, and a distinctive relation of the word "that," are determined by the sentence of which it is a logical element. This enriching inquiry into the formation of sentences is termed Syntax.

*Rhetoric.* Rhetoric is concerned with such problems as punctuation, capitalization, diction, sentence-qualities, figures of rhetoric, poetry, etc. Inasmuch as punctuation, capitalization, choice of words, and arrangement of the parts of a sentence, are practically indispensable in the formation of sentences, these topics should never be divorced from their connections. To this extent grammar employs rhetoric. In due time, "composition," *i.e.*, the combination of sentences, brings all the higher concerns of rhetoric and logic into grammar.

## II. THE PSYCHOLOGY OF GRAMMAR.

The ideal method of studying "words in sentences," as well as plants or animals, or any other subject, consists of observation, induction, and deduction. (See the Tenth Principle of Instruction.)

**Observation in Grammar.** The first step in the formal study of "words in sentences" is observation, *i.e.*, the ascertainment of facts. The observer in grammar must examine

sentences just as observers in botany examine flowers, *i.e.*, he must look for parts, properties, relations, etc. In language as in other spheres instances are generally individuals of a genus, and therefore suggestive of laws. But there are many irregularities in language. Therefore the observer should examine many instances before he ventures to generalize, lest the generalizations have insufficient grounds. If, for example, the student of grammar wishes to study pronouns, he must make as large a collection of pronouns as possible, and observe them as used in sentences.

**Induction in Grammar.** The second step in the formal study of "words in sentences," is induction, *i.e.*, the ascertainment of laws. Inasmuch as instances in language are generally individuals of a genus, induction begins with the justifiable hypothesis that what was found true in particular may also be true in general. The distinctive object of induction in the larger sense, is to verify such hypotheses. In order to accomplish this purpose, the observer must gather sentences from all sources and offer them as evidence. Should irregularities be discovered in the sentences offered, the hypothesis must be either corrected or abandoned; but if all the offered sentences confirm the hypothesis, it is accepted as law. If, for example, the student of *etymological* grammar wishes to ascertain into how many parts of speech the English language must be classified, or what case prepositions govern, he gathers evidences from various sources, proving, as he can in these cases, that there are no exceptions to his hypotheses. Proceeding in the same way in *syntax*, he finds that the rule of agreement of subject and predicate has several exceptions, which he therefore records, and thus corrects his hypothesis. This method of discovery, since it is both historical and rational, is the ideal method of ascertaining all the general truths of grammar, whether it be in orthography, etymology, syntax, or prosody. It should be made the habit of all students.

**Deduction in Grammar.** The final step in the formal study of "words in sentences," is deduction, *i.e.*, the classification of individual words and parts of sentences, and their use according to discovered laws. There are three distinct deductive processes in grammar: (1) Parsing; (2) Analysis, and (3) Construction of Sentences.

*Parsing.* The comparison of a sentence-word with the concepts of its objective function and relations, *i.e.*, with the concepts of etymology, is termed Parsing. The language by means of which these deductive explanations are made, requires many technical terms, such as noun, gender, tense, voice, etc.

*Analysis.* The comparison of sentence-parts with the concepts of their logical functions and relations, *i.e.*, with the concepts of syntax, is termed Analysis. The language of these deductive explanations of a sentence, as well as the language of parsing, requires technical terms, such as subject, predicate, adjuncts, etc.

*Construction of Sentences.* (1) Faulty sentences may be corrected, *i.e.*, made to conform with violated laws. Such deductive reformation of sentences is commonly known as the correction of *false* syntax. (2) Original sentences may be constructed in conformity with the laws of grammar. Such deductive formation of sentences, the supreme end in view in the study of grammar, is commonly known as *true* syntax.

**The Definition of Grammar.** The method of study just described, together with a systematic statement of truths, constitutes science. Grammar is therefore a science; and, since its subject is "words in sentences," it is correctly defined as the science of "words in sentences," or, simply, the science of sentences. But, as a systematic guide to usage, grammar is also an art, and may be so defined. Accordingly, grammar is the science and art of sentences.

## III. THE HISTORY OF GRAMMAR.

The history of grammar is conveniently studied under the following heads : (1) The Development of Grammar ; (2) Text-Books of Grammar ; and (3) The Popularity of Grammar.

**The Development of Grammar.** A complete history of developments in grammar, though essential in a course of general grammar, would require too much space for our present purpose, and could hardly be justified by the demand. A brief account, however, seems necessary at this time.

The Hindoos and Greeks were the pioneers in grammar. (1) " Among the Hindoos the science of grammar arose in immediate connection with the study and interpretation of their sacred books, and served the main purpose of explaining and of maintaining in purity of form the ancient or classical language, the Sanskrit, which had ceased to be the language of the people and was regarded as the peculiar property of the priestly class." (2) Among the Greeks the beginnings of grammar are found in the works of the philosophers. The parts of speech were partly identified and defined by Aristotle, and additions were made by the Stoics. It was not until the second century before Christ that Alexandrian scholars developed a complete system of Greek grammar. In preparing correct texts of the Greek classics, especially of Homer, these scholars found that the manuscripts differed, and then determined the correct form by comparison with the language of Homer. (3) Modern developments in grammar consist chiefly of expansions, superstructures, rational correlation of departments, practical applications, and improvements in presentation. The long domination of humanism in education has made grammar almost as exact a science as mathematics.

**The Text-Books of Grammar.** Great changes of content and method have been introduced into the text-books of grammar since the time of Zenodotus and Aristarchus, the great

grammarians of Alexandria. The little handbook of Dionysius Thrax, a pupil of Aristarchus, was "the basis for all the Greek grammars down almost to modern times," and, through its virtual use by Chrysoloras and the Renaissance scholars, it determined the traditions of school grammars for all European languages; but the old Dionysius became more and more portly and precise. The Romans left the science of grammar largely to Greek scholars. Terence, a contemporary of Cicero, is famous for his reports concerning the materials of the older Latin and the Italic dialects. An introduction to Lilly's Latin Grammar, by John Colet, published in 1510, and the exclusive standard in England for more than three centuries, was the first attempt at English grammar. In 1586, William Bullokar wrote an exclusively English grammar. "In 1758, Bishop Lowth published his celebrated grammar, an excellent work from which Lindley Murray drew most of his materials. Lindley Murray published his first grammar in 1795, and his *Abridgement* in 1797, a work which has been extensively used in this country and in England. This popular work was largely derived from Lowth and Priestly, and owed its popularity to its practical adaptation to the work of the school-room." Gould Brown's grammar is probably the ablest and most celebrated American work. Among the many excellent grammars of our own times are those of Dr. Lyte, Dr. Welsh, and others.

**The Popularity of Grammar.** From the time of its first introduction, grammar has occupied an important place in schools. The Renaissance made grammar a necessity, and the long domination of humanism in education (see Painter's "History of Education") kept "the first of the seven liberal arts," first in honor down to modern times. America is not far behind in its respectful attitude toward formal grammar. It has long been looked upon as the disciplinary study *par excellence*, not only in elementary, but also in secondary education.

For fuller presentations of the history of grammar, methods-students are respectfully referred to Johnson's "Universal Cyclopædia," "The Cyclopædia Britannica," "The Century Dictionary," etc.

## B. INSTRUCTION IN GRAMMAR.

The nature of grammar makes inquiry into the following subjects a necessity for teachers of grammar: (1) The Courses of Instruction in Grammar; (2) The Special Objects of the Courses; (3) The Subjects of Study; (4) The Methods of Instruction; and (5) The Importance of Grammar.

### I. THE COURSES OF INSTRUCTION IN GRAMMAR.

The number of necessary adaptations of the subject and method of grammar to the powers and needs of pupils, determines, as it does in other branches, the number and character of the courses of instruction. (See the Principles of Instruction.) The following topics, therefore, deserve special attention: (1) The Nature of the Subject; (2) The Pupil in Grammar; and (3) The Number of Courses in Grammar.

- **The Nature of the Subject.** In grammar, consisting as it does practically of etymology and syntax, there are two species of necessary judgments. (1) The judgments of etymology are *objective*, *i.e.*, they have to do with the various objects of thought as classified in the parts of speech. (2) The judgments of syntax are *subjective*, *i.e.*, they have to do with thoughts themselves. There is, however, an important distinction between direct comparison and syllogism. (See the chapter on Mental Activity.)

**The Pupil in Grammar.** Objective judgments are possible before subjective judgments. (See Principles of Knowledge.) They are necessary stepping-stones in abstraction. Subjective judgments presuppose considerable maturity in re-



flection. The syntax of simple sentences, as the history of grammar shows, follows etymology as a natural sequence, and is only slightly more difficult. The syntax of complex and compound sentences consists of anatomic analysis and synthesis of syllogisms, and thus requires a maturity in logical thought to which few pupils attain before the high school epoch. The anomalies and subtleties of which the structure of English sentences often consists, require a keenness of analysis and a maturity in language to which few can attain before the college epoch.

**The Number of Courses in Grammar.** In view of the psychology of grammar and the powers of pupils, it seems appropriate to arrange three courses of instruction in grammar: (1) The elementary course for etymology and the simple sentence; (2) The intermediate course for complete etymology, and the complex and compound sentences; and (3) The higher course for anomalies and subtleties in English classics.

## II. ELEMENTARY GRAMMAR.

The distinctive features of any course of instruction come to view as ends to be accomplished, ground to be covered, or methods of work. (See Principles of Instruction.) The following topics, therefore, deserve attention at this point: (1) The Objects of Elementary Grammar; (2) Its Subjects; and (3) The Methods of Instruction.

**The Objects of Elementary Grammar.** The subjective judgments so important as reinforcements of etymology in elementary grammar (see Courses in Grammar), require a maturity of mind seldom found in pupils prior to their seventh year in school. In the two years of the grammar school epoch which thus remain, many elementary inductions and corresponding deductions in grammar can be successfully accomplished.

*The Inductions of Elementary Grammar.* (1) The technical

names of the concepts of grammar, as noun, tense, modifier, should, as a matter of economy, be taught from the beginning. (2) The pupil of elementary grammar should seldom, if ever (see the Sixth, Seventh, Eighth, and Tenth Principles of Instruction), be allowed to use definitions which were not developed in his own mind. The ability to describe a concept in original language, is the best proof that the pupil knows the thing in question. The danger of putting a text-book in the hands of pupils in elementary grammar, is, therefore, very great. (3) The concepts of relation (agreement, government, etc.) should be expanded into laws, and expressed in the form of rules. This process, like that of definition in grammar, presupposes considerable mental maturity, and requires great skill in teachers. The rules, like the definitions of elementary grammar, should at first be expressed in the pupil's own language.

*The Deductions of Elementary Grammar.* In order to make the concepts of elementary grammar permanent possessions of the pupil's mind, to enlarge them, and to cultivate the habit of deductive or practical judgment in language, words in sentences should be parsed, the sentences analyzed, incomplete sentences completed, defective sentences corrected, and original sentences constructed. (See the First, Second, Fourth, and Eighth Principles of Instruction.) This necessary work should, of course, be as informal as possible, and yet as systematic as possible.

*The Subjects of Elementary Grammar.* Regard for logical sequence requires that a definite order be observed in passing from subject to subject in grammar, as in any other branch of study. (See the chapter on The Nature of Knowledge.)

*The Order of Subjects in Elementary Grammar.* (1) The most objective, and therefore the most elementary task in grammar, is to classify words into parts of speech. This task

does not presuppose analytic knowledge of sentences. (2) After the noun, verb, adjective, and adverb have been taught as parts of speech, they should be presented as subject, predicate, and modifiers in sentences. (3) All the parts of speech should then be taught in their first form in sentences. (4) The properties and modifications of the parts of speech should then be introduced as variations in sentence relations. (5) The classes of the parts of speech, with the exception perhaps of common and proper nouns, and personal pronouns, can be understood only when the properties of the parts of speech and the anatomy of sentences have been taught. Some classes, as the relative pronoun, cannot be fully taught until the complex sentence has been introduced. (6) Complex and compound sentences whose thought relations are obvious, should, as a reinforcement of etymology, be introduced in the second year of grammar. (7) The development of a new concept or rule should always be followed by such informal parsing and analyzing as may be possible. The sentences used in these exercises may be invented by the teacher or selected from the pupil's reading book. (8) Practice in reforming, completing, and constructing sentences, should be connected with the development of rules. The exercise of completing sentences, though it may require more labor on the part of the teacher, since he must prepare them with such omissions as may serve the ends in view, is more effective in the formation of right habits than the exercise of correcting sentences. The latter is as likely to impress errors as truths. Nevertheless, the incorrect sentences used by pupils should be subjected to most careful reconstruction.

*The Number of Subjects in Elementary Grammar.* Just how much ground to cover in two years of elementary grammar, must, of course, depend much upon the capacity of the class and the skill of the teacher. It does not seem necessary, however, nor desirable, to teach all the concepts and rules of

grammar, even in their most elementary phases. Much of this work can be done with greater satisfaction in the intermediate course.

**The Method of Instruction in Elementary Grammar.** The ideal method of *study*, as already pointed out, consists of observation, induction, and deduction, in the order just submitted. The ideal method of *instruction* (see Principles of Instruction) should, therefore, *cause* these mental processes in the pupil.

*The Method of Observation in Elementary Grammar.* Examples of that which is to be taught must be presented to the pupil's attention. The pupil's inquiry must be assisted by means of questions, hints, etc. In this way the elementary *facts* of grammar may be taught.

*The Method of Induction in Elementary Grammar.* Many instances of that which is to be taught must be presented to the child's attention. Such questions, hints, etc., as may help the pupil to see that what is true of instances is *generally* true, must be added with great care. The pupil will need the teacher's constant guidance in the original definitions, original statement of rules, and original illustrations, which must be required as the necessary discipline in induction.

*The Method of Deduction in Elementary Grammar.* The difficulties in parsing, analyzing, etc., as they present themselves in elementary grammar, must be divided and adapted to the pupil's power. The necessary concepts in these deductive judgments must be kept perfect in the pupil's mind, lest confusion should result. Sentences in which the ideas are too abstract and general, or the thought too complex, must, of course, be avoided in elementary deductions.

**Illustrative Lessons in Elementary Grammar.** The following lessons are subjoined as illustrations of the method just described. They are designed as suggestions, and should not be slavishly imitated by methods-students.

**The Concept "Noun."** *Teacher.* Please name five objects, James. *J.* Box, hat, pencil, chair, apple. *T.* Since these words are names of *objects*, what may we call them, Kate? *K.* Perhaps we may call them *object-words*. *T.* What then is an object-word? *K.* An object-word is the name of an object. *T.* An object-word may be called a *Noun*. Who can define a noun? *James.* The name of an object is called a *Noun*. *T.* Please find the nouns in this sentence (writing it on the board). Write the nouns of your yesterday's reading lesson, and bring the list to-morrow morning. (The complete definition should be developed in the next few lessons.)

**The Concept "Verb."** *Teacher.* Nell, what do birds do? *N.* Birds sing, fly, eat, drink. *T.* Since these words are the names of actions, what may we call them? *Robert.* Action-words. *T.* What then is an action-word? *R.* The name of an action is called an action-word. *T.* An action-word may be called a *verb*. Who can define a verb? *Emily.* The name of an action is called a *Verb*. *T.* Please find the verbs in this sentence (writing it). Make a list of verbs in your reading lesson of yesterday, and bring the list to-morrow morning. (The complete definition should be taught in the following lessons.)

**The Concept "Adjective."** *Teacher.* Are these objects in all respects alike? *Alfred.* The pencil is round and black; the ruler is flat and brown. *T.* Since the words round, black, flat, and brown name the qualities of objects, what may we call them, class? *C.* Quality-words. *T.* But since these words name the quality of *objects*, what kind of quality-words should we call them? *C.* Quality-object-words. *T.* What then is a quality-object-word, John? *J.* The name of the quality of an object is called a quality-object-word. *T.* A quality-object-word may be called an *Adjective*. (The teacher should explain fully.) *T.* Who can define an adjective? *Mildred.* The name of a quality of an object is called

an *Adjective*. *T.* Please find the adjectives in this sentence (writing it). Write in a column on your slate the adjectives in your yesterday's reading lesson, and bring the list to the grammar recitation to-morrow. (The complete definition of adjectives should be developed soon after pronouns.)

**The Concept "Adverb."** *Teacher.* Are the actions which you observe (moving in various ways) in all respects alike, Thomas? *T.* Sometimes you walked fast and then slowly; sometimes you looked up and then down. *Teacher.* Since the words *fast*, *slowly*, *up*, and *down* name the qualities of actions, what may we call them? *Mary.* Quality-action-words. *T.* To what part of speech are they added, Thomas? *T.* To verbs. *Teacher.* For that reason quality-action-words are called *Adverbs*. Who can define an adverb? *Mary.* The name of a quality of an action is called an *Adverb*. *T.* Please find the adverbs in these sentences (writing a number of sentences). Write in a column the adverbs of your yesterday's reading lesson, and bring the list to-morrow. (The development of the complete definition of an adverb will require comparisons of the qualities of *objects* and of *actions*. Pupils should be required to write illustrative sentences.)

**The Concept "Subject."** (The pupils have learned what a sentence is, and the species of sentence, in language work.) *Teacher.* Which word in the sentence (Birds sing) which I have just written, names that about which something is said? *Helen.* The noun *birds*. *T.* What is that about which we write in a *composition* called, Claude? *C.* It is called the *Subject*. *T.* What then may we call the word *birds* in our sentence? *C.* The *subject* of the sentence. *T.* Who can define the subject of a sentence? *Florence.* That about which something is said in a sentence, is called the *Subject*. *T.* Please name the subjects of the sentences that I shall read from this book. Write in a column the subjects of the sentences of your to-day's reading lesson, and bring the list to-morrow.

(The pupils should be required to construct original sentences, underscoring the subject. The fact that phrases and clauses can be subjects, should probably not be taught the first year.)

**The Concept "Predicate."** *Teacher.* In this sentence (the teacher writes *Boys run*), which word tells something about the subject, Frank? *F.* The verb *run*. *T.* Since the word *run* tells or asserts something about the subject, what might we call it? *F.* A telling, or asserting word. *T.* Yes; or a Predicate. Who can define a predicate? *Mary.* That which is said about the subject of a sentence, is called the *Predicate*. (Exercises like those under the preceding heads, should be added. The fact that the verb of interrogative and imperative sentences is also a predicate should be taught in the next lesson. Attributes and objects should be introduced soon afterwards.)

**The Concept "Modifier."** *Teacher.* Please read the sentence which I have written, Elmer. *E.* "Good boys study faithfully." *T.* Which word names the quality of the subject, Gertrude? *G.* The adjective *good*. *T.* And which word names the quality of the predicate? *G.* The adverb *faithfully*. *T.* Such words are called *Modifiers*. James, what then is a Modifier? *J.* A word that names the quality of the subject or predicate, is called a Modifier. *T.* Since the word *good* is an adjective, what kind of a modifier may we call it? *J.* An adjective modifier. *T.* And the word *faithfully*? *J.* An adverbial modifier. *T.* Please define an adjective modifier. An adverbial modifier. (Exercises similar to those already suggested should be added. The use of phrases and clauses, as modifiers, and the modification of attributes and objects, should be gradually introduced. Only one new point should be attempted at a time. Concepts already taught should be frequently reviewed. The methods-students should be required to write out the suggested recitations.)

**The Concept "Pronoun."** *Teacher.* John, please read the sentence which I have written. *J.* "Mildred holds Mildred's book." *T.* And this sentence, James? *J.* "George holds George's wheel." *T.* How could we express the same thoughts without repeating the words *Mildred* and *George*? *J.* We can say "Mildred holds *her* book," and "George holds *his* wheel." *T.* Of what parts of speech do the words *his* and *her* take the place, Annie? *A.* They take the place of nouns. *T.* What may we call words used *for* nouns? *A.* I think we may call them *for-nouns*. *T.* Yes; or *Pronouns*, because *pro* means *for*, or *instead of*. Who can define a pronoun? *G.* A word used for a noun is called a *Pronoun*. *T.* Please open your readers and find the pronouns in your yesterday's lesson. James, you may write these pronouns on the board as fast as your classmates find them for you.

**The Concept "Conjunction."** *Teacher.* Please read the sentence which I have written, Mary. *M.* "He sells books and pictures." *T.* What word connects two words in the sentence? *M.* The word *and* connects the words *books* and *pictures*. *T.* What may we call words that connect or conjoin others? *M.* We might call them *conjoining* words. *T.* Yes; conjoining words, or *Conjunctions*. Who can define a conjunction? (Such exercises as have been suggested should follow. The other uses of conjunctions should be introduced one at a time.)

**The Concept "Preposition."** (The meaning of the word "relation" can be best taught by using it.) *Teacher.* Where is the book, Mary? *M.* On the table. *T.* And now? *M.* It is under the table. *T.* And where is it now? *M.* In my lap. *T.* Which words then did you use to express the *relation* of the book and table, or your lap? *M.* The words *on*, *under*, and *in*. *T.* What may we call words which show the relation of things? *Mabel.* Relation-words. *T.* Yes; or *Prepositions*. (The pupils should be led to see why they are



so called, but not at first.) *T.* James, what is a preposition? *J.* A word which shows the relation of things is called a *Preposition*. (The usual exercises should follow.)

**The Concept "Case."** (This property can be most conveniently taught at first by means of pronouns, where the *form* of the word is a help.) *Teacher.* Please read the sentences which I have written, Charles. *C.* "James struck me." "I struck James." "James hit my hand." *T.* Do the words *I*, and *me*, and *my*, refer to different persons? *C.* They all refer to the same person. *T.* If these words all refer to the same person, why are they not all spelled the same way? *Emily.* They are not *used* the same way: the word *I* is the subject of a sentence; the word *me* is an object; and the word *my* denotes ownership. *T.* These changes of form to suit the use of words as subject, object, and owner, are termed *Case*. Since the word *me* names the *object* of the sentence, in what case may we say that it is, Ralph? *R.* In the *object-case*. *T.* Yes; or the *Objective* case. What words then are said to be in the objective case, Mildred? *M.* A word used as the object of a sentence, is said to be in the objective case. *T.* Since the word *my* denotes ownership or possession, in what case is it? *M.* In the *Possessive* case. *T.* What words therefore are in the possessive case? *M.* A word that denotes possession, is said to be in the possessive case. *T.* A word used as the subject of a sentence, is said to be in the *Nominative* case. James, please name the three possible cases that we have now found. Describe each case. (Sentences in which *nouns* are used instead of pronouns, should next be studied. The objective case after prepositions, can also be most conveniently taught with pronouns. The possessive form of nouns should be carefully studied. Special lessons on the nominative case *by address* may be attempted the second year. The nominative *absolute* should probably not be attempted before the intermediate course. The other properties of nouns and pronouns should

be taught in the same way as *Case*. The methods-students should be required to write out recitations on person, gender, and number.)

**The Concept Tense.** *Teacher*. Ruth, please read the sentences which I have just written. *R*. "Mary laughs." "Mary laughed." "Mary will laugh." *T*. To what times do the verbs in these sentences refer, Henry? *H*. The first verb refers to *present* time; the second, to *past* time; and the third, to *future* time. *T*. The change of form in words to denote different times, is called *Tense*. Since the word *laughs* denotes present time, in what tense may we say that it is, Emma? *E*. In the *present* tense. *T*. The word *laughed*? *E*. In the *past* tense. *T*. And the words *will laugh*? *E*. In the *future* tense. *T*. Mary, what is meant by tense? Present tense? Past tense? Future tense? (The other tenses, and all the other properties of the verb, should be taught in the way suggested. The methods-students should be required to write out the necessary recitations.)

**The Concept "Comparison."** *Teacher*. Newton, please read the sentences on the board. *N*. "Maude's picture is grand." "Miriam's picture is grander than Maude's." "Grace's picture is the grandest of all." *T*. Please underscore the words which tell the quality of the pictures, James. (James underscores the right words.) *T*. Why are these words not all alike in form? *J*. To denote *unlikeness* in the quality of the pictures. *Teacher*. Change in the endings in adjectives and adverbs to express degree in quality, is termed *Comparison*. The first degree is termed *Positive*; the second, *Comparative*; and the third, or highest, *Superlative*. (These terms, though introduced arbitrarily at first, should be explained as soon as possible. The various spellings of regular and irregular adjectives and adverbs, should be illustrated, and finally classified. The methods-students should be required to write out the necessary recitations.)

**The Concepts "Regular" and "Irregular" Verb.** *Teacher.* Please read the sentences on the board, Grace. *G.* "The boy honored his father." "She sang a beautiful hymn." *T.* What is the tense of both verbs? *G.* The past tense. *T.* How is the past tense, or preterit, formed in the first sentence, Robert? *R.* By adding *ed* to the present tense form? *T.* That is the usual, or regular, way of forming the preterit of verbs. What therefore may we call verbs whose preterit is thus formed? *R.* *Regular* verbs. *T.* Ruth, what is a regular verb? An irregular verb? (Care should be taken not to classify verbs whose preterit is formed by adding *d*, as *ceased*, with irregular verbs.) Please think of five regular verbs, Helen. Mary, find five irregular verbs in this reader. (The usual exercises should, of course, not be omitted. All the classes of the parts of speech should be taught in the same way. The methods-students should be required to write out the necessary recitations.)

**The "Element" Concepts.** *Teacher.* Please read the sentence on the board, Harry. *H.* "Alas! Poor David wept very bitterly and very penitently." *T.* Which are the necessary parts in this sentence? *H.* The subject and the predicate. *T.* Since the subject and predicate are the necessary parts, or elements, of a sentence, what may we call them, Walter? *W.* The necessary elements. *T.* Yes; the necessary, or *Principal* Elements. *T.* Since the modifiers of the subject and predicate, including the attribute and object, are not essential elements of the sentence, what may we call such modifiers, Thomas? *Thomas.* Perhaps it would do to call them *modifier* elements. *T.* That name would do; they are commonly called *Subordinate* Elements. Please point out the principal and the subordinate elements of the sentence which you read. Why are they so called? What parts of speech are the words *poor*, *bitterly*, and *penitently*, James? *J.* *Poor* is an adjective; the other words are adverbs. *T.* Then what

may we call these elements? *J.* Adjective elements and adverbial elements. (The term *Adjunct* may be introduced at this point.) *T.* Since it is the business of conjunctions to *connect*, what kind of an element may we call the word *and*, Grace? *G.* A *Connective* Element. *T.* Since *Alas* is not at all connected with the sentence so far as its form goes, what may we call it, May? *M.* We might call it the *Independent* Element. (Other sentences illustrating the same points should be studied until the new terms are familiar. By and by *phrases* and *clauses* should be introduced as subordinate elements; relative pronouns and conjunctive adverbs should be made *connectives*; and other words besides interjections should be used as *independent* elements. The methods-students should be required to write out the necessary recitations.)

**The "Rules" of Grammar.** The rules of grammar should be introduced the second year, but not until the anatomy (see the preceding study) of the sentence is pretty familiar. One illustration must suffice. *Teacher.* Please read the sentence on the board, Alma. *A.* "The boy whom the gypsies had stolen, has been recovered." *T.* What part of speech is the word *whom*? *A.* A relative pronoun. (It is presumed that this concept was developed under classes of the parts of speech.) *T.* What is the person of the word *whom*, Elsie? *E.* It is of the third person (this concept was developed under properties of nouns and pronouns), because its antecedent is of that person. *T.* What other properties of *whom* do we know by its antecedent, Calvin? *C.* The number and gender. *T.* Put all these truths into one sentence, George. *G.* A relative pronoun agrees with its antecedent in person, number, and gender. *T.* What you have just said is *always* true of relative pronouns. Such general truths are termed *Rules*. Hereafter when you parse a relative pronoun, you will be expected to remember the rule which you found just now. (The methods-student should be required to write

out the necessary recitations for the development of several rules.)

**A Word to Methods-Students.** Methods-students should not expect too great success in these inductive-deductive lessons at first, nor should they hope to obtain ideal answers from their pupils. If, however, the main course be kept in mind, deviations can be corrected.

### III. INTERMEDIATE GRAMMAR.

The distinctive features of intermediate, as well as of elementary grammar, present themselves under the following heads: (1) The Objects of the Course; (2) Its Subjects; and (3) The Method of Instruction.

**The Objects of Intermediate Grammar.** The object of intermediate grammar (see The Number of Courses) is greater perfection in its inductions and deductions.

*The Inductions of Intermediate Grammar.* The concepts developed in elementary grammar, require enlargement. It is seldom possible to develop some of the most essential concepts of syntax before the high school epoch. The development of complete definitions in so abstract a study as grammar, requires considerable maturity. The same is true of rules as expressions of remote relations.

*The Deductions of Intermediate Grammar.* The deductive comparisons required in parsing and analyzing complex and compound sentences, presupposing complete development of concepts and rules, are for that reason impossible for most pupils before the high school epoch. The successful deductive construction of all species of sentences (the *practical* object of grammar), presupposes correct standards of comparison and critical habit, and must therefore be regarded as tasks of maturer minds.

**The Subjects of Intermediate Grammar.** The great subjects of intermediate, or high school grammar, in accord-

ance with its objects, are : (1) Definitions ; (2) Rules ; (3) Inflections ; (4) Parsing ; (5) Analysis ; and (6) Exercises in Syntax. Three or four years should be devoted to this course, the number of recitations to be determined by practical considerations.

**Definitions in Intermediate Grammar.** (1) The incomplete definitions developed in elementary grammar should now be completed, care being taken that all definitions are correct descriptions of the pupil's conceptions. (2) New definitions, descriptions of the new concepts developed in the intermediate course, must, of course, be added. (3) In order to make the concepts contained in definitions permanent possessions, and thus ready standards for the deductive comparisons necessary in parsing, analyzing, and syntax, intermediate pupils should be required to *commit* definitions. For practical reasons, it is probably best to require intermediate pupils to commit the *text-book* definitions, or those of the teacher, but always in connection with the necessary inductive approaches.

**Rules in Intermediate Grammar.** (1) As a practical guide in constructing sentences, the "rules" of grammar, *i.e.*, the statements of its general truths, must, of course, be committed, at least virtually if not *verbatim*, but never until the necessary inductive approaches have been made. For reasons of economy, the statements of the text-book in use are probably the most convenient. (2) "Notes" and "exceptions," though of great practical importance, should not be committed *verbatim*, since their contents can be readily associated with the "rules" to which they belong. Familiarity with these notes and exceptions is, however, a practical necessity.

**Inflections in Intermediate Grammar.** (1) In elementary grammar, inflections, *i.e.*, declensions and conjugations, must necessarily be fragmentary ; but, in intermediate grammar, these fragments should be gradually collected into wholes,

mastered in thought, and memorized. (2) Irregular declensions and conjugations require special attention. The principal parts of irregular verbs, together with other irregularities of the parts of speech, should be thoroughly memorized and frequently used in syntax.

**Parsing in Intermediate Grammar.** The deductive explanation of "words in sentences," like inflection, must necessarily be fragmentary in elementary grammar. In other words, elementary pupils should be expected to point out the parts of speech in question, naming such properties as may have been studied, and answering such questions as the teacher may put. But, in intermediate grammar, parsing should become a definite system of explanations.

*Forms of Parsing.* Some definite plan, or scheme, of parsing, commonly the scheme of the book in use, should be adhered to in intermediate classes. In parsing a noun, for example, the scheme might consist of the following order: (1) Class; (2) Gender; (3) Person; (4) Number; (5) Case; and (6) Rule. Whatever scheme may be adopted, it should be as simple and logical as possible. Every part of a scheme should be thoroughly understood, lest parsing become a meaningless repetition of words. To be practically serviceable, such forms must be memorized. Forms of parsing are necessary for several reasons: (1) They enable pupils to parse a word completely without hesitation, thus saving time; (2) They enable the listening pupils and the teacher to detect and remember errors more effectively, and thus serve the interests of the recitation; and (3) They promote habits of orderliness in written recitations, and economize time in criticising such recitations.

*Enthymeme Statements in Parsing.* For some time, at least, intermediate as well as elementary pupils should be required to add reasons to their statements in parsing words. In the sentence, "Man is mortal," the word *is*, for example, should

be parsed as follows : *Is* is a neuter verb, *because it expresses being* ; etc. To save time and to preserve thoughtfulness, those reasons with which the pupil is known to be familiar, should not be required. Rules should generally be fully stated. The objects of enthymeme statements in parsing are as follows : (1) The requirements tend to make the concepts presupposed in these deductive judgments, permanent possessions ; (2) It is an admirable discipline in syllogistic thought, promoting right habit and preparing for logic.

*Simple Statements in Parsing.* As soon as it seems safe for pupils to do so, they should be required to parse words completely without adding reasons to classifications. In the sentence, "Great Cæsar fell," the word *great*, for example, should be parsed as follows : The word *great* is a descriptive adjective of the positive degree ; it modifies the word Cæsar, according to the rule, "Adjectives relate to nouns and pronouns." To make sure that pupils parsing this way do not let acquired concepts slip, and that they think as well as speak in parsing, the teacher must ask for reasons wherever he suspects defections. The reasons for parsing in this way are as follows : (1) It saves time without injury to the pupil's mind ; (2) It is an admirable discipline in rapid thinking, promoting the habit of decision in connection with that of accuracy ; and (3) It is more interesting to parse in this way when much of it has to be done.

*Abbreviations in Parsing.* In written parsing some system of abbreviations is convenient. The following scheme is proposed by Dr. E. O. Lyte in his "Grammar and Composition." Write the sentence whose words are to be parsed in one line if possible. Draw a line under the words to be parsed, and write the initial letters of the parsing in a vertical column under the respective words. Do not use punctuation marks. When necessary, use a dotted line to separate the written parsing of two words.



Illustration :

The enemy advancing, he ordered the signal to be given.

r i n v

r t f v

i t — n v

par

a

p

pr

ind

inf

enemy

pa

pr

(rule)

he

signal

3

(rule)

s

(rule)

For fuller explanation the student is respectfully referred to Dr. Lyte's Grammar and Composition.

The objects of such abbreviations are as follows: (1) The plan is serviceable in preparing lessons for the teacher's inspection; (2) It is useful in combination with oral parsing, as a variation from the full forms, and as a means of parsing more sentences in a given time. (3) The plan must, however, be carefully guarded, lest pupils make it a system of deceptions.

*Eclectic Parsing.* As a rule, intermediate pupils should be required to parse the words of a sentence in order. By and by, however, the process of parsing should become eclectic. There are two species of elective parsing: (1) Those words or parts of speech with which the pupils are known to be familiar, may be ignored; and (2) The teacher may ask such questions about certain words in the sentence as seem to him to test the pupil's knowledge. Both forms are convenient with advanced pupils: (1) The plan saves time and tends to preserve interest in grammar; (2) It is a better mode of discipline, since it requires constant attention and thoughtful judgment.

*The Proportion of Oral and Written Parsing.* Oral parsing takes less time, but written parsing is a better discipline in language. Written parsing saves time as a supplement in recitations, and is a convenient mode of exhibiting the prepara-

tion of lessons. Oral parsing, though not as effective as a discipline in language, is indispensable as a language exercise. Probably younger pupils should do more oral, and older pupils more written parsing.

*Errors in Parsing.* There are two species of errors in parsing: (1) The pupil may say the wrong thing, as when he calls a verb a noun though he knows better. This is termed an error of form. (2) The pupil may have the wrong idea, as when he regards a regular verb irregular. This is termed an error of judgment. Errors of form are due either to thoughtlessness or slips of the tongue, and may be remedied by removing the causes. Errors of judgment are due either to imperfect inductions or slips of memory, and must be remedied by perfect induction or review.

*The Objects of Parsing.* The objects of parsing are as follows: (1) To exercise pupils in acquired knowledge, thus making it a permanent possession; (2) To exercise pupils in deductive judgments, thus developing the important power of deductive thought; and (3) To equip pupils with standard conceptions for the criticism and construction of sentences.

*Analysis in Intermediate Grammar.* In elementary grammar, the pupil is confined almost altogether to simple sentences and informal analysis. The intermediate course is concerned more especially with complex and compound sentences, and the process of analysis becomes a complete system of deductive explanation.

*Forms of Analysis.* There are two possible forms, or plans, of analyzing a sentence, the synthetic and the analytic: (1) In synthetic analysis the simple subject and predicate are named, and their adjuncts added. Take this sentence for example: The man who committed that dreadful crime, was arrested by the officers. This is a complex declarative sentence, consisting of one principal and one dependent clause. The simple subject of the principal clause is *man*, modified by the adject-

tive adjuncts *the* and the relative clause *who committed that dreadful crime*. The simple subject of this dependent clause, is *who*, the predicate of the clause is *committed*, and the object *crime*, modified by the adjective adjuncts *that* and *dreadful*. The whole, or logical subject is, therefore, *The man who committed that dreadful crime*. The simple predicate of the principal clause is *was arrested*, modified by the adverbial adjunct phrase *by the officers*, of which phrase *officers* is the object, modified by the adjective adjunct *the*, and governed by the preposition *by*. The whole predicate of the principal clause is *was arrested by the officers*. (2) In analytic analysis the whole subject and predicate of the principal clause, are named first. The whole subject is then analyzed into its parts, as in synthetic analysis, the dependent clause included. The same thing is done with the principal predicate. (3) The synthetic form of analysis is a little simpler and allows more time for reflection, and is, therefore, more appropriate for younger pupils, while the analytic form is more logical and should, therefore, be used by older pupils.

*Enthymeme Statements in Analysis.* Until there can be no doubt that pupils use the technical language of analysis intelligently, they should be required to add reasons to statements, as in parsing. This requirement seems self-evident, but it has been so commonly violated, and with such bad effects on the mental life of pupils, that it must be urged upon teachers as the indispensable thing.

*Simple Statements in Analysis.* When there can be no doubt that the technical language of grammatical analysis is understood by the pupils, they should not be required to use enthymeme statements. For illustrations, see the analysis of the sentence under "Forms of Analysis." The reasons for such simple statements in the analysis of a sentence are the same as in such parsing. (See the paragraph on "Simple Statements in Parsing.")

*Abbreviations in Analysis.* In analyzing a sentence, as in parsing, and for the same reasons, systems of abbreviation are convenient. Various systems of such analysis are proposed in the text-books of Brown, Lyte, Hadley, and others. To these books on grammar the methods-student is respectfully referred. The following illustration is taken from Dr. Lyte's "Grammar and Composition." It is the analysis of the sentence "An idler is a watch that wants both hands."

$$\begin{array}{rcl}
 \text{Cr D} & \left| \begin{array}{l} \text{idler}^s \\ \text{An}^{\text{adj}} \\ \text{is}^p + \\ \text{watch}^s \text{ p n} \\ \text{a}^{\text{adj}} \\ \text{adj} \left| \begin{array}{l} \text{that}^s \text{ so} \\ \text{wants}^p + \\ \text{hands}^{\text{d o}} \\ \text{both}^{\text{adj}} \end{array} \right. \end{array} \right.
 \end{array}$$

*Eclectic Analysis.* With advanced pupils time can be saved and thought promoted by eclectic parsing. In this mode of analysis the teacher simply inquires into the difficulties of a lesson, and, if the answers to his questions are satisfactory, he assumes that his pupils understand the whole lesson. Eclectic parsing is, therefore, a risk with immature pupils, since it assumes too much.

*Grammatical Description.* Grammatical description is an eclectic union of parsing and analysis. Its design is two-fold: (1) It saves time by ignoring unimportant details; and (2) It is an admirable exercise in thinking. It is, however, not appropriate for younger pupils, since it presupposes training in both parsing and analysis. The subjoined treatment of the sentence, *The little bird that sang so sweetly in my garden yesterday, was wounded this morning by a hunter*, is an illustration of the synthetic method of grammatical description. The analytic method is readily derived.

The proposed sentence is a simple declarative sentence. *The* is an article; it is used to modify *bird*. *Little* is an adjective; it also is used to modify *bird*. *Bird* is a noun; it is used as the subject of *was wounded*. *That* is a relative pronoun, and its antecedent is *bird*; it is used as the subject of *sang*; it introduces the clause *that sang so sweetly in my garden yesterday*, and joins it to *bird*. *Sang* is a verb; its subject is *that*. *So* is an adverb; it is used to modify *sweetly*. *Sweetly* is an adjective; it modifies *sang*. *In* is a preposition; it is used to introduce the phrase *in my garden*, and joins it to *sang*. *My* is a personal pronoun; it is used to modify *garden*. *Garden* is a noun; it is used as the object of *in*. *That sang so sweetly in my garden yesterday* is a clause used as an adjective; it modifies *bird*. *The little bird that sang so sweetly in my garden yesterday* is the entire subject of the sentence. *Was wounded* is a verb; its simple subject is *bird*. *This* is a demonstrative adjective; it is used to modify *morning*. *Morning* is a noun; it is used as an adverb of time, and modifies *was wounded*. *By* is a preposition; it is used to introduce the phrase *by a hunter*, and joins it to *was wounded*. *A* is an article, and modifies *hunter*. *By a hunter* is a phrase used as an adverb; it modifies *was wounded*. *Was wounded this morning by a hunter* is the entire predicate of the sentence.

*Diagrams in Grammar.* A grammatical diagram is a picture by which it is proposed to represent to the eye the relations of words in sentences. Professor Clark's system is a very clever invention, and has been favorably received. The system used in Reed and Kellogg's grammar not only "looks well on the board," but is an effective instrument in the teacher's hands. The *objections* to grammatical diagrams are as follows: (1) It is not true that lines and directions can picture the anatomy of *thoughts*; (2) The diagram that will represent the anatomy of a lengthy complex or compound sentence, is probably more difficult to understand than the

analysis without diagrams. The legitimate *uses* of diagrams are as follows: (1) They represent the anatomy of a *sentence*, and are *thus* effective helps in the analysis of the thought of the sentence; (2) They are admirable modes of written recitation, saving much time and adding interest to the study of grammar; and (3) They are useful modes of preparing lessons for the teacher's inspection.

It is believed, however, that the simplest possible system of diagrams is the only justifiable one, and that even then there is danger of making the diagram too prominent at the expense of the pupil's development in logical independence.

*Errors in Analysis.* Two species of error are possible in analyzing a sentence: (1) The pupil may err in language, as when he miscalls elements of the sentence or misrepresents relations by diagrams and abbreviations. These errors of *form* are caused either by thoughtlessness, slips of the tongue, slips of memory, or defective instruction. The removal of these causes is the proper remedy. (2) The pupil may err in thought, as when he mistakes the elements of a sentence or their relations. These errors of *judgment*, as they are called, are commonly caused either by inattention, lack of preparation, imperfect inductions, or slips of memory. The causes should be removed.

*The Proportion of Oral and Written Analysis.* Oral analysis is probably more interesting than written analysis, and takes less time. It is also better than written analysis as an exercise in rapid thinking. Written analysis is the proper supplement in recitation, and offers a better opportunity to do correct and complete work. It is also an indispensable requirement in the preparation of lessons for the teacher's inspection. Probably, therefore, oral analysis should preponderate over written analysis in younger classes, and *vice versa* in older classes.

*The Relation of Analysis to Parsing.* (1) Parsing is a prepa-

ration for analysis in two ways: (*a*) It furnishes many necessary technical terms; and (*b*) It introduces the pupil to the word-individuals which are the elements of sentences. (2) Analysis reinforces parsing in two ways: (*a*) It presupposes and employs the ideas and language acquired in parsing; and (*b*) It reveals properties of the parts of speech which parsing alone could not discover, as in the case of relative pronouns, prepositions, etc. (See "Grammatical Description.")

*The Objects of Analysis.* The objects of analysis are as follows: (1) It is an admirable exercise in deductive thinking, and tends to develop critical power; (2) It is a fine training in the expression of ideas and thoughts; and (3) It equips for the criticism and construction of sentences.

**Exercises in Syntax.** The study of each rule of relation, agreement, government, and arrangement, should be supplemented (1) by criticism of sentences in whose structure the rule in question or some rule already studied, is violated; and (2) by original construction of sentences according to some rule or rules.

*False Syntax.* (1) A collection of suitable sentences for exercise in the correction of false syntax, is generally found in text-books on grammar. The teacher may supplement this collection, if he sees fit to do so. The false syntax so commonly found in school-rooms and on school-grounds, should be noted down and criticised. (2) It is sometimes urged that such attention to false syntax tends to fix the false forms as habits of the pupil. This is only too true where pupils are allowed to read, write, and hear these sentences *without correction*. The correct must, of course, be made to prevail over the incorrect. This is the *law* of right habit. (3) There are various forms of correcting false syntax, some one of which should be adhered to, though not too mechanically, in class work. The subjoined oral and written correction of the sentence, "Was it him whom you saw?" illustrates

a common and convenient method of correcting false syntax.

(1) The sentence is incorrect. The objective pronoun *him* is used as an attribute complement. In its place the nominative pronoun *he* should be used, according to the rule that a noun or pronoun used as an attribute complement must be in the same case as the subject to which it refers. (2) The sentence should therefore be, Was it he whom you saw?

The methods-students should be required to write out the synopsis of these illustrations and apply the plan to other cases of false syntax. Any other systematic plan will serve the same purpose. (See text-books on grammar.)

*Original Sentences.* Intermediate students should be required to construct sentences in conformity with studied rules. Early in the course these exercises should be developed into brief compositions on various topics. It is of the greatest importance to require students writing such compositions to *justify* the construction of every sentence, *i.e.*, to show that it conforms with law.

*The Importance of Exercises in Syntax.* It should ever be kept in mind that the practical objects of the study of grammar are the following: (1) To develop adequate power, right habits, and correct tastes, in the construction of sentences, and to construct sentences deductively; and (2) To prepare the student to understand and appreciate the construction of sentences in literature.

**The Method of Instruction in Intermediate Grammar.** The distinctive features of intermediate methods come to view under the following heads: (1) Text-Books of Intermediate Grammar; (2) The Preparation of Lessons; and (3) The Recitation.

*Text-Books of Intermediate Grammar.* (1) The first text-book of intermediate grammar should be planned for observation, induction, and deduction, in such proportion as will best serve the purposes in hand. (See "The Objects of Intermediate



Grammar.") Dr. Lyte's *Grammar and Composition*, and several other late grammars, are illustrations of this ideal method. The fact that the great majority of text-books have been too deductive in plan, accounts at least partially for the failures recorded in the history of grammar. (2) After about two years' study of a book like Dr. Lyte's, a text like Brown's "Institutes of English Grammar," whose plan is deductive, should be taken up for a year or two. (3) The grammar of several English classics, such as Gray's "Elegy" and Pope's "Essay on Man," together with Latin or German grammar, should be added to Brown in high schools and Normal schools, with the special purpose of cultivating analytic power and critical taste.

*Preparation of Lessons in Intermediate Grammar.* The lesson having been definitely assigned, intermediate pupils in grammar should be required to observe, to parse and analyze, and to correct and construct sentences, etc., according to the plan of the lesson. Some of this work should be prepared in writing and submitted for inspection. Parsing and analyzing by abbreviation, as indicated, and diagrams, should constitute parts of the student's preparation. The pupil should be expected to be master of the definitions and rules that may be in question.

*The Recitation in Intermediate Grammar.* The objects of the recitation (see the Fifth General Principle of Education) are culture and instruction.

For the *culture* of all the mental functions the following tasks may be assigned: (1) To state, explain, and illustrate definitions or rules; (2) To decline, conjugate, or compare words; (3) To parse certain words of a sentence; (4) To analyze a sentence; (5) To correct or construct sentences according to rule. This work should, of course, be partly oral and partly written, the proportion depending on the nature of the tasks and the purposes of the teacher.

(1) While part of the grammar class is working at the board, the teacher must supervise the oral work, adding cor-

rections and information wherever the right opportunity presents itself. (2) When the board-workers read what they have written, there will be splendid opportunities to make corrections and to add information. The task of correcting board-work should be divided between the class and the teacher. Much of the success to which the teacher hopes to attain will depend on the skill with which he adds information in class.

#### IV. HIGHER GRAMMAR.

Our limits forbid all but a brief outline of the work to be done in higher grammar. The following outline is subjoined as a stimulus to teachers and special students.

**The Objects of Higher Grammar.** The ends in view in higher grammar are as follows: (1) The attainment of such scholarship as the merits of the branch justify; (2) The preparation of students for the comprehension and enjoyment of literature so far as such comprehension and enjoyment depend on training in grammar; and (3) The development of such practical proficiency in grammar as may serve the practical interests of the various occupations and professions.

**The Subjects of Higher Grammar.** The course of higher grammar belongs to the latter part of the high school epoch, to Normal schools, and to preparatory schools of high grade.

*Higher Grammar of High Schools.* To the work already mapped out for high schools, the following tasks may be added where the circumstances allow it: (1) A special course in the anomalies of English grammar; (2) A course in the correlation of grammar with rhetoric, logic, etc.; (3) A course in the grammar of the most difficult English master-pieces; and (4) A course of composition in which the special object is the deductive construction of sentences.

*Higher Grammar in Normal Schools.* The Normal school should offer a course of grammar equivalent to that mapped

out for high schools. The special stand-point of Normal schools requires such a course for two reasons : (1) As a preparation for the pedagogics of grammar ; and (2) As an equipment in teaching grammar. There should be constant reference to such higher text-books on grammar as Whitney's, etc. The history and philosophy of grammar should, of course, be connected with the pedagogics of grammar. (See "The Nature of Grammar.") A course of comparative grammar is also desirable for teachers and specialists.

*Higher Grammar of Preparatory Schools.* The purposes of preparatory schools requires a course in grammar equivalent to that mapped out for high schools. (1) Such a course serves as a disciplinary means in preparing for college ; and (2) It is indispensable as a preparation for the study of philology and foreign grammar.

**The Method of Instruction in Higher Grammar.** The method employed in intermediate grammar is virtually the right method for higher grammar. The higher phases of the subject, the special purposes in view, and the individuality of the teacher, must determine the necessary adjustments. The pedagogics of grammar is a problem of psychology and economy, and must obviously be studied from those stand-points.

## V. THE IMPORTANCE OF GRAMMAR.

To appreciate the importance of grammar, one must understand its efficiency as a means of culture and instruction. The following topics deserve special consideration : (1) The Culture Value of Grammar ; (2) The Instruction Value of Grammar ; (3) The Practical Value of Grammar ; and (4) The Training of Teachers of Grammar.

**The Culture Value of Grammar.** The nature of the subject (see beginning of this chapter) and the necessary method of instruction make grammar the possible means of cultivating all the functions of the intellect, but especially the

understanding. (The methods-student should be required to prove this statement.) As the virtual study of the structure of thought, together with concomitant emotion and volition, it is an admirable exercise of self-consciousness. But, studied rightly, grammar is more than a discipline of the intellect; the joy of inductive discoveries and deductive uses, rouses the whole "heart" into responses; and the caution, concentration, and purpose, so essential in the right study of grammar, make it a most excellent discipline of the will. "The Committee of Fifteen" says: "Grammar demonstrates its title to the first place by its use as a discipline in subtle analysis, in logical division and classification, in the art of questioning, and in the mental accomplishment of making exact definitions. Nor is this an empty formal discipline, for its subject matter, language, is a product of the reason of a people not as individuals but as a social whole, and the vocabulary holds in its store of words the generalized experience of that people, including sensuous observation and reflection, feeling and emotion, instinct and volition." One-sided training in grammar, however, may have serious results. On this point the same committee says: "Grammar, rich as it is in its contents, is only a formal discipline as respects the scientific, historic, or literary contents of language, and is indifferent to them. A training for four or five years in parsing and grammatical analysis practised on literary works of art (Milton, Shakespeare, Tennyson, Scott) is a training of the pupil into habits of indifference toward and neglect of the genius displayed in the literary work of art, and into habits of impertinent and trifling attention to elements employed as material or texture, and a corresponding neglect of the structural form which alone is the work of the artist."

**The Instruction Value of Grammar.** The study of the structure of sentences is virtually the study of the structure of thought, admittedly the most important study of man. The

fact that thought cannot be isolated from emotion and volition, makes the study of grammar the great anteroom of psychology proper. On this point "The Committee of Fifteen" says: "It shows the structure of language, and the logical forms of subject, predicate, and modifier, thus revealing the essential nature of thought itself, the most important of all objects, because it is self-object."

**The Practical Value of Grammar.** The practical advantages of grammar are as follows: (1) It offers a systematic guidance in the construction of sentences, and is, therefore, of inestimable value to spoken and to written discourse; (2) It is the indispensable preparation for the study of rhetoric, logic, foreign languages, and philology; (3) It is impossible to comprehend and appreciate fully the structural agency of literature, without a thorough training in grammar; and (4) The proper study of grammar develops habits of mind which are of the greatest importance as practical equipments.

**The Training of Teachers of Grammar.** The responsibility of teachers of grammar must, of course, be measured by the importance of the study. If, therefore, grammar is as important to pupils as just explained, it is evident that teachers of grammar need the best possible training in grammar. This training consists of two items: (1) Training in grammar itself. This training, as elsewhere stated, is needed in the *art* as well as in the *science* of teaching grammar. Without such proficiency, grammar will be distasteful to students and a failure as an educational instrument. (2) Training in the principles and methods of teaching grammar is necessary. Since this topic was the subject of the present chapter, it is hoped that further discussion may not be necessary.

## CHAPTER VIII.

## ARITHMETIC.

THE purpose in hand requires that in this chapter our attention be directed to (1) The Nature of Arithmetic; and (2) Instruction in Arithmetic.

## A. THE NATURE OF ARITHMETIC.

In order to form a correct idea of the nature of arithmetic, it is necessary to consider the following topics: (1) The "Subject" of Arithmetic; (2) The Psychology of Arithmetic; (3) The Definition of Arithmetic; and (4) The History of Arithmetic.

## I. THE "SUBJECT" OF ARITHMETIC.

It is with "numbers" (how many), rather than with the nature and relations of things, that arithmetic has to do. But, as in drawing, it is rather the acts than the lines in question in those acts that constitute the "subject" of study (though both together are the subject), so in arithmetic it is rather the operations than the numbers in question in those operations that constitute the subject of arithmetic (though both together are the subject). A complete description of the "subject" of arithmetic, therefore, requires the consideration of the following topics: (1) The Nature of Numbers; and (2) The Number-Operations.

**The Nature of Numbers.** Parts of any kind which together constitute a whole for the mind, thus constitute what is termed a Unit. Any unit in the conception of which the mind is unconscious of arbitrary division is termed an Integral Unit. The division of the integral unit gives rise to the Fractional Unit, as one-third. A unit or collection of units is

termed a Number, as one, one-half, two. With reference to units, there are three species of numbers: (1) The integral unit or a collection of integral units is termed an Integral Number, as one, nine. (2) The fractional unit or a collection of fractional units is termed a Fractional Number, or Fraction, as one-half, one-tenth. There are three familiar species of Fractions, (a) Common Fractions, (b) Decimal Fractions, and (c) Duodecimal Fractions. Simple reference to these species of fractions must suffice at this point. (3) When the integral unit is a conventional unit of measure, as one-pound, the corresponding numbers, as one pound, one half pound, three pounds, are termed Denominate Numbers.

*An Important Distinction.* It is important to distinguish the concepts denoted by the term "number" and "numbers." The concept "number" is general; the concept "numbers" is particular in its application. Numbers (*a* number, *the* numbers) are either definitely or indefinitely particular. It is only with number in the definite sense of "just how many" that we have to do in arithmetic.

**The Number-Operations.** The quantitative character of numbers gives rise to three number-operations, (1) Synthesis, (2) Analysis, and (3) Comparison.

*The Synthesis of Numbers.* The possible modes of synthesis of numbers, as determined by the nature of number, are as follows: (1) To fix the mind on each object of a collection, to ascertain the number of objects; (2) To fix the mind on given numbers in succession, to ascertain the sum; and (3) To take a number a number of times, to ascertain the product. These modes of synthesis are termed respectively (1) Counting, (2) Addition, and (3) Multiplication. Counting is the most elementary process of addition, and multiplication is addition by uniform repetition. There are two distinct varieties of multiplication: (1) A number of numbers may be used as factors, and the product ascertained. This process is termed *Compo-*

sition. (2) A number may be used a number of times as a multiplier, and the product ascertained. This process is termed Involution.

*The Analysis of Numbers.* The possible modes of analysis of numbers, as determined by the nature of number, are as follows: (1) To take a number from a number, to ascertain the difference; and (2) To take the same number away as often as possible, to ascertain the number of times one number contains another. These modes of analysis are termed respectively (1) Subtraction, and (2) Division. Division is subtraction by uniform diminution, and there are two distinct varieties: (a) A composite number may be subjected to successive divisions, the numbers of which it is composed being thus ascertained. This process is termed Factoring. (b) A number may be resolved into the equal factors of which it is the product. This process is termed Evolution.

*The Comparison of Numbers.* The possible modes of comparing numbers, as determined by the relation of numbers, are as follows: (1) The comparison of two equivalent numerical quantities; (2) The comparison of two unequal numbers; and (3) The comparison of two equal relations of numbers. The equations which express these three modes of comparison are termed respectively (1) Simple Equation, (2) Ratio, and (3) Proportion. The ends in view are respectively, (1) To transform any numerical quantity into a more desirable form, as  $2 \times 3 = 6$ ; (2) To measure the relation of unequal numerical quantities, as  $12:15 = \frac{4}{5}$ ; and (3) To complete one ratio by means of another, as  $b:6 = 1:4$ . These equations, as the thoughtful reader will see, are really the thought-processes in the various modes of synthesis and analysis just described in the text. Indeed, all the judgments of arithmetical processes fall into the form of equations.

*The Language of the Number-Operations.* For various reasons it is as important to express number-concepts and



number-operations truthfully, as it is to describe objects and events. In order to carry on, as well as to express and record the number-operations, a language *sui generis* is requisite. The complexity of many number-concepts and number-operations requires a language in which the elements are few and their capacity for composition as great as possible. The most remarkable adaptation to these requirements is the Arabic system of numeration and notation. The Arabic figures (1, 2, 3, 4, 5, 6, 7, 8, 9, 0), and various sign supplements, are few enough to satisfy any critic. The method of combining these characters and giving them value according to the place which they occupy toward the right or left, each figure being worth ten times as much every place toward the left, is one of remarkable power. The value of the method is increased by the simple system of grouping the places and naming the groups. The Roman notation, as any one can understand who will take the time to think about it, is far inferior to the Arabic system, and, except as a means in expressing differences in emphasis, has become almost obsolete. Only one other system, the proposed duodecimal notation, in which two additional characters are employed, and in which each figure toward the left is worth twelve times as much as if it stood a place further toward the right, is superior to the Arabic, or decimal system. It is superior to the Arabic system in its greater capacity to express common fractions in few figures. But, whatever may be said about the numeration and notation, *i.e.*, about speaking, writing, and reading numbers, this is obvious, that numeration and notation, as a *sui generis* and necessary means in number-operation, must be made the subject of special study.

*The Subject of Arithmetic.* (1) From the foregoing considerations it appears that the properties and relations of numbers, together with the number-operations (synthesis, analysis, and comparison) and the language-means, are the "subject" of arithmetic. (2) The concrete applications of the number-

operations, as well as many other problems found in our arithmetics, belong essentially to the domain of logic. Indeed, all problems are logical exercises. In other words, problems are statements of conditions, or premises, and the worker is required to construct the syllogism or series of syllogisms, by means of which he can obtain the conclusion. It must, however, be remembered that, while these logical processes require the services of arithmetic, they are not in the technical sense the "subject" of arithmetic.

## II. THE PSYCHOLOGY OF ARITHMETIC.

Three things must be included in our present conception of arithmetic: (1) A well-defined system of operations; (2) An organic body of Principles; and (3) The logical adjustment of arithmetic to practical and theoretical spheres. The mental steps in the development of arithmetic are respectively: (1) Observation, (2) Induction, and (3) Deduction.

**Observation in Arithmetic.** The observation of numbers begins with the conception (see chapter on Mental Activity) of number as quantity. The concept of number as quantity implies the possibility of synthesis, analysis, and comparison. It is assumed that, as a means in the conception of particular numbers, these processes, at least in their simplest modes, are spontaneous in all minds. When the mind matures it observes variations in the elementary processes of synthesis, analysis, and comparison, or subjects them voluntarily to experiments in which the conditions are constantly varied. Some of these variations are doubtless accidental; but, whether accidental or intentional, it is through them that all the species of synthesis, analysis, and comparison of numbers are discovered. This necessary genesis of the number-concepts determines both the method and course of instruction in these concepts.

**Induction in Arithmetic.** Believing that things are subject to law, and that a knowledge of laws is advantageous in

life, the observer commonly repeats his observations on numbers in order to discover the laws (general truths). Four species of such general truths may thus be discovered : (1) Laws to which, as determined by the nature of number, there can obviously be no exceptions, and which are commonly termed *Axioms*, as “The whole is greater than any of its parts” ; (2) Laws to which, as contained in axioms, there can obviously be no exceptions, and which are commonly termed *Principles*, as “Multiplying the denominator or dividing the numerator of a fraction by any number, divides the fraction by that number” ; (3) Laws to which, since they are not obvious contents of axioms, there may be exceptions, and which are commonly termed *Theorems*, as  $x^2 + x + 41 =$  a Prime Number, or  $(x + y)(x - y) = x^2 - y^2$  ; and (4) Laws to which, as determined by experiment, it is convenient to conform in performing number-operations, and which are commonly termed *Rules*, as “Invert the divisor and proceed as in multiplication.” Though many general truths of arithmetic have been discovered by induction, as just explained, all of them except axioms, and possibly these, too, can be obtained by deduction. The latter method requires greater maturity of mind, and therefore belongs as a task to higher courses in arithmetic.

**Deduction in Arithmetic.** (1) Induction in the larger sense, the sense in which it is taken in the preceding pages on arithmetic, implies deduction in its narrow sense, as means by which to verify the hypotheses that prompt observers to repeat their observations. If, for instance, it be found that the circumference of the circle is equal to its diameter multiplied by 3.1416 (particular truth), it may be supposed that such will be the case with all circles ; but this hypothesis must be verified by satisfactory experiments. Each experiment begins with the assumption that the hypothesis is a general truth, and is therefore a deduction in the narrow sense. If all these deductions confirm the hypothesis, the induction is complete,

and may be expressed as follows : (a) The multiplication of this diameter by 3.1416 gave the circumference of this circle ; (b) The deductive experiments represent all possibilities ; therefore, (c) The multiplication of the diameter by 3.1416 always gives the circumference of a circle (a separate general truth of complete Induction). The deductions involved in complete induction are generally sub-conscious processes ; but they are nevertheless always present. (2) Having discovered general truths in arithmetic, the student may derive less general truths from these, and solve problems as particular cases. The possibility of solving problems as examples of a class, justifies the hard labor involved in complete induction and constitutes the practical argument in favor of arithmetic as a branch of study in our schools.

*The Definition of Arithmetic.* The method of study just described, together with a systematic statement of truths, constitutes science. Arithmetic is therefore a science ; and, since its subject is "numbers," it is correctly defined as the science of numbers. The word numbers as a term in this definition must, however, be understood to include the number-operations and the language of numbers and number-operations, since all these together constitute the "subject" of the science. And since one important end in view in the study of arithmetic is the attainment of skill in performing the number-operations, it is practically correct to define arithmetic in the terms of our authors as "The science of numbers and the art of computing with them."

*The History of Arithmetic.* A complete treatment of this subject requires reference to the following points : (1) The history of the various number-processes ; (2) The history of numeration and notation ; (3) The history of the discovery of general truths of arithmetic ; (4) The history of the services of arithmetic in practical and theoretical spheres ; and (5) The history of the pioneers and masters of arithmetic. A complete

consideration of these topics would require too much space for our present limits, and an abridged treatment would be unsatisfactory. A knowledge of the history of arithmetic is, however, not only interesting to thoughtful students, but of great importance to teachers of arithmetic. The history of arithmetic prepares the teacher of arithmetic to appreciate arithmetic, and therefore makes it more likely that earnest work will be done in teaching arithmetic. Accordingly, school teachers are respectfully referred to such helpful works as (1) "The Philosophy of Arithmetic," by Dr. Edward Brooks; (2) "The History of Mathematics," by Florian Cajori.

#### B. INSTRUCTION IN ARITHMETIC.

The nature of arithmetic makes inquiry into the following subjects a necessity for teachers of arithmetic: (1) The Courses of Instruction in Arithmetic; (2) The Ends in View; (3) The Methods of Instruction; (4) Written Arithmetic; (5) Mental Arithmetic; and (6) The Importance of Arithmetic.

#### THE COURSES OF ARITHMETIC.

The courses of instruction in arithmetic, as in other branches, are determined by at least three important factors: (1) The evolution of arithmetic; (2) The pupil's possible progress; and (3) The needs of life and science.

**The Evolution of Arithmetic.** Three degrees of difficulty are distinguishable in the study of arithmetic: (1) The stage of obvious relations, when the numbers in question do not pass perception, and required operations, as well as the required thoughts, are simple; (2) The stage of remoter relations, when the numbers in question require imagination as a supplement to perception, and the required operations, or their applications to life and science, are complex; and (3) The stage of remotest relations, when the numbers in question pass imagination, and the required operations, or their applications to life and science,

are very complex. These three degrees of difficulty must be respected. (See Principles of Instruction.)

**The Pupil's Progress.** Psychology discovers three stages of possibility in study : (1) The stage of dependence, when concrete thinking predominates very much over abstract thinking, and imitation (Principles of Knowledge) is the rule ; (2) The stage of transition, when abstract thinking is closely coördinate with concrete thinking, and the pupil depends more upon his own resources ; and (3) The stage of independence, when abstract thinking predominates over concrete thinking, and the pupil depends virtually upon his own resources. These stages of possibility must be respected. (See the First, Second, and Third Principles of Instruction.)

**The Needs of Life and Science.** The needs of life and science cannot affect the order in which the subjects and phases of arithmetic should follow each other, since these are absolutely a matter of relation between the subject and the pupil ; but these needs, unless indeed schools owe nothing to life, and science can shift without arithmetic, must be recognized in determining how much arithmetic a pupil should study. (See the Fifth General Principle of Education, and the Fourth Principle of Instruction.)

*The Necessary Courses of Arithmetic.* If the matter of arithmetic must be adjusted to the stages of the pupil's possibility (First Principle of Instruction) and to his lot (Fourth Principle of Instruction), there must evidently be the following courses of instruction : (1) The Elementary Course ; (2) The Intermediate Course ; and (3) The Higher Course.

## I. ELEMENTARY ARITHMETIC.

The distinctive features of instruction in elementary arithmetic arrange themselves under three heads : (1) The Ends in View ; (2) The Method of Instruction ; and (3) The Order of Subjects.

**The Ends in View in Elementary Arithmetic.** The right ends (see Principles of Education) in view in elementary arithmetic are as follows: (1) To build such number-concepts (integral, fractional, and denominate), and such concepts of operation (synthesis, analysis, and comparison) as may be possible by way of perceptive experiments, and such number-language (speaking, writing, and reading) as may be necessary in these tasks; (2) To train pupils to perform the "four" operations (addition, subtraction, multiplication, and division) as intelligently, accurately, quickly, and neatly, as possible, first with integers, then with fractions, and finally with denominate numbers; (3) To develop the power to work such problems as arise in the young pupil's life, and such disciplinary exercises as good sense may dictate; and (4) To develop some ability in describing numbers and operations, and in explaining obvious relations.

**The Method of Instruction in Elementary Arithmetic.** The logical genesis of knowledge (see "Principles of Knowledge," and "The Psychology of Arithmetic") determines the method of instruction. (See Fifth Principle of Instruction.) Therefore (see Tenth Principle of Instruction) the tasks of instruction in elementary arithmetic (see preceding paragraph) can be accomplished only by the "development" method, whose conspicuous features, as explained, are (1) Observation, (2) Induction, and (3) Deduction.

*Teaching the Number-Concepts.* The events in the practical development of the number-concepts are perception, conception, expression, and recognition. (1) Inasmuch as numbers must at first be thought as the "how many" of things, things are the indispensable means in lessons on numbers. The pupil must be required to observe the number (how many) in any convenient collection of objects, such as beans, splints, strokes, etc. The attention of the pupil in these observations must be kept upon the number rather than upon the nature and rela-

tion of the objects observed. The required attention is more complex than it seems ; it really amounts to perception, direct comparison, and abstraction. (2) The successive abstractions in this process of attention, supply the pupil's mind with the particulars out of which he spontaneously builds his *concept* of the number in question, as one, three, five. (3) The name of the number must, of course, be associated with the idea of the number to be taught, as "five." (See First Principle of Knowledge.) The pupil should be required to write and read, as well as speak, the name of the number which he is learning, although, in order to keep the pupil from thinking simply signs instead of numbers, the writing and reading ought to be omitted the first few weeks. (4) The pupil really defines a number to himself in his conception of the number, formed, as just explained, by counting objects ; but such conceptions should be reinforced by many *recognitions* of the number learned. It is by means of such deductive recognitions that the pupil's inductions (conceptions) become his permanent possessions.

*Teaching the Concepts of Operation.* When the pupil knows of "how many" a number, as "four," consists ; that is, when he has learned the number as a "quantity," he should be led to see the possible arrangements of the "units" of which the quantity is constituted. In other words, objects must be so placed, let us say on a table, that the pupil comprehends the following abstract truths in the concrete :

$4 = 1 + 1 + 1 + 1$	$4 - 1 = 3$	$4 = 1 \times 4$	$4 \div 1 = 4$
$4 = 2 + 1 + 1$	$4 - 2 = 2$	$4 = 2 \times 2$	$4 \div 2 = 2$
$4 = 3 + 1$	$4 - 3 = 1$		
$4 = 2 + 2$	$4 - 4 = 0$		

As soon as possible (see Principles of Instruction) the pupil should be required to record his experiments by means of signs and figures, as in the text. The end in view in all such elementary exercises (perceptive experiments) is to teach the



*concepts* of addition, subtraction, multiplication, and division. The systematic treatment of the numbers from one to a hundred, and even beyond that, in the way just described, is sometimes called the "Grube Method," in honor of the celebrated German who first developed these exercises into a system. (See Professor Seeley's excellent adaptation of the Grube system to American schools.)

*Teaching Number-Language.* The Arabic number-language (see page 243) is composite. Accordingly (see the Second Principle of Instruction), the method of teaching it is by "synthesis of elements." The process of teaching number-language should begin, as explained in the paragraph on "Teaching the Number-Concepts," with the oral names of the numbers, as one, two, three, etc. These names should also be written and read as soon as these abstract exercises are appropriate. When the pupil has learned to speak, write, and read the elements of the Arabic number-language, the following exercises should be taken up in order: (1) Ten and one, ten and two, etc., up to ten and nine, should be illustrated by means of objects. The names eleven, twelve, etc., up to twenty, must, of course, be added by associating them with the names ten and one, ten and two, etc. (2) The pupil should next be taught to count two tens and one, etc., up to nine tens and nine, the names twenty-one, etc., being added as before. (3) The numbers from one hundred to one thousand may be illustrated by means of bundles of splints, etc. (4) At any time after the pupil has learned to write nine, he may be taught to write ten and two, ten and one, and then ten, to help him see the use of zero. Thus:  $1 \mid 2$ ,  $1 \mid 1$ ,  $1 \mid 0$ . This lesson on "place-value" is the "key" lesson to the Arabic system of notation and numeration; it is the key lesson to all the higher number-groups. (5) When the pupil has learned to write as far as nine tens and nine, he must be taught to call the collection of ten tens one hundred, writing it  $1 \mid 0 \mid 0$ .

The terms units, tens, and hundreds should now be introduced, the "numeration" at first always preceding the "reading" of the number. (6) When the pupil has learned to write, numerate, and read as far as nine hundred ninety-nine, he must be taught to call the collection of ten hundred one thousand, writing it 1 | 0 | 0 | 0. (7) Finally, the pupil must be taught that higher groups, as millions, billions, etc., are formed by multiplying the lower group by one hundred instead of ten. This concept can be taught most conveniently by the following arrangement, the same figures being used for all groups at first in order to simplify the conception. Thus :

Millions,			Thousands,					
h	t	u	h	t	u	h	t	u
1	2	5	1	2	5	1	2	5

Of course, it must not be forgotten that while these lessons on number-language are being given, the Grube exercises are to be continued and the "four" operations developed into formal addition, subtraction, multiplication, and division.

*Teaching the Number-Operations.* The pupil is ready (see First and Second Principles of Instruction) for lessons in formal addition and subtraction as soon as he has made a fair start in the Grube exercises. It is better to teach addition and subtraction together, the two being natural complements, and easily illustrated as complements. The pupil is ready for lessons in formal multiplication and division as soon as he knows the required "tables." It is better to teach multiplication and division together, not only because they are natural complements, but also because the same "tables" can be used. The "four" operations and the construction of the "tables," must be made the subject of as many observations as may be necessary for the pupil's understanding and memory. (1) The

teacher must work illustrative examples, the pupil observing and remembering the process, thus reasoning from the particular cases to the "rule." (2) The pupil must be made to understand that he "carries," "borrows," passes "toward the left," or "toward the right," in the "four" operations, because he can thus utilize the "place value" of the figures in his notations. This process of reasoning from the first uses of "place" in notation to others, and still others, even to its general use, is not as difficult an induction for pupils as is sometimes supposed, provided that the new cases are properly graded from the simple to the complex. Objective illustrations are, of course, necessary in the earliest explanations. (3) Many exercises (deductions) must be added in order to reinforce the pupil's inductions, to make them permanent possessions, and to develop speed, as well as accuracy and neatness in performing the operations. (4) Common fractions, decimal fractions, and denominate numbers, should be gradually introduced into the "four" operations, but the tasks must be carefully graded. (5) The pupil's impressions will be deepened and corrected very effectively by the effort to describe and explain, while at the same time there will be a great gain for the pupil's language.


*Teaching Exercises and Problems.* The pupil should be required to work exercises in which the "four" operations, or as many of them as are known to the pupil, are so combined as to tax and thus develop his thinking powers. (See the First, Second, Sixth, and Seventh Principles of Instruction.) In the same way and for the same reason, as well as in the interests of practical life, concrete problems should be constructed for the pupil. The teacher should not be too ready to assist his pupils in such exercises and problems; he should, however, give them such directions, ask such questions, and prepare such paths, as will enable them to help themselves. (See the Eighth Principle of Instruction.)

*The Means in Elementary Arithmetic.* The course in elementary arithmetic should extend through the pupil's first five years. (See the First, Third, and Fourth Principles of Instruction.) (1) So far as the understanding of the child is in question, it matters very little whether books be used or not, since written language will be used in board-assignments as well as in books. Probably it would be best for several reasons to use no books the first two years, great care being taken in that event to write the questions very plainly in a conspicuous place, so as to save the pupil's eyes. An appropriate book should be used after the second year, both as a matter of economy in time, and as an instrument in the educational transition of the child. As a moral precaution, the work required of elementary arithmetic pupils between recitations should be done in school hours and under the teacher's eye. (2) The questions should often be recited without resort to figures in the performance of the necessary number-operations, and in complete sentences; but generally the reasoning process should be expressed only in outline by means of figures and such supplementary words as may be necessary. In such a compromise between "mental" and "written" arithmetic, the former will serve as a special discipline in analysis and language; the latter will save time and train in practical speed.

**The Order of Subjects in Elementary Arithmetic.** The submitted list of subjects is a catalogue of things to be taught in elementary arithmetic, and somewhat in order: (1) The concepts of the integral numbers, together with counting, Grube exercises, and the necessary number-language. (2) The "four" operations with integral numbers, together with the necessary "tables," number-language, Grube exercises, and concrete problems. (3) The concepts of the common fractions, together with the corresponding Grube exercises, progress in the four operations with integers, progress in notation and

numeration, progress in concrete problems, and progress in explanation. (4) The rules of the four operations with common fractions, together with "speed" drills and progress in former subjects. (5) The concepts of the decimal fractions, together with the rules of the four decimal operations and progress in all preceding subjects. (6) The concepts of the simpler denominate numbers, together with the four operations, the necessary tables, and progress in all preceding subjects.

**Illustrative Lessons in Elementary Arithmetic.** The subjoined lessons are designed to be illustrations of the development method (observation, induction, and deduction) in elementary arithmetic.

**The Concept "Five."** *Teacher.* How many grains of corn have I just now placed before you, James? *James.* Four and one. *T.* Yes; four and one, or five. Please pick up five books and take them to Jane. Count five cracks in the floor, touching each place with this pointer. Which of the cracks is five, Miriam? *Miriam.* It takes all of them together to make five. *T.* Please arrange these splints in fives, like this,  etc.

**The Grube Treatment of "Four."** *Teacher.* What have I done, Henry? *Henry.* You placed four blocks on the table. *T.* Please arrange them in a row, placing them a little way apart from each other. What can you now say about the four blocks? *H.* Four blocks are one and one and one and one block. *T.* Please record what you have found out. (Henry writes on the board, as he has been instructed,  $4 = 1 + 1 + 1 + 1$ .) *T.* Move the first block against the second. What can you now say about the four blocks, Annie? *Annie.* Four blocks are two blocks and one block and one block. *T.* Please record right below our first record. Now arrange them in another way, James. *James.* This way four is two and two, but if I place them thus, four is three and one. *T.* Very well; now record your facts. The blocks, as you see, are all

together. Please take one away, James, and tell what is true of four. *James*. Four less one is three. *T*. Dodd, you may keep the record at the board to the end of the recitation. James, put back the block which you took. Now, Mabel, give me two blocks, and tell what is true of four and the two. *Mabel*. Four less two is two. *T*. Take three away. Four. Yes, Dodd, your record is correct. Now put the blocks right in front of James and close together. How many times—I mean how often—can you touch a different block until you have touched them all, James? *James*. I can touch four times. *T*. Then how many times one is four, James? *James*. Four is *four times* one. *T*. How many times can you touch all the blocks at once, James? *James*. Only one time. *T*. Four is how many times four? *James*. Four is *one time* four. *T*. Put the blocks together again. Mabel, please take two blocks from the table. How often can you take two from four? *Mabel*. I can do it two times. *T*. Then how many times does four allow you to take two away? *Mabel*. Two times. *T*. Yes; four contains two just two times. Now how many times does four “contain” four? *Mabel*. Four contains four only one time. *T*. How many times does four contain *one*? *M*. Four contains one *four times*. *T*. Please take these splints, each of you only four, and arrange them as we arranged the blocks. Write the records on your slate, and let me see them when you recite again. (By and by, when the pupils know the meanings of the signs  $+$ ,  $-$ ,  $\times$ ,  $\div$ , very well, they should be requested to think all the possibilities of a number, and record the facts by means of the signs in an orderly way.)

**The Names of Numbers.** *Teacher*. Please count the splints on the table before you, James. *J*. There are nine. *T*. Write the figure “nine.” (Handing another splint to James.) How many are there now? *James*. Ten. *T*. Please write what you said. *J*. I do not know how. *T*. You will

be able to write ten by and by. Now, suppose we tie ten splints into a bundle, and call it "one ten." How many will there be, if we add two splints? *James*. There will be "one ten" and two. *T*. Yes; one ten and two, or, as we say, "twelve." (The new names are introduced by "association.") Now watch, and I will show you how to write "twelve," that is, "one ten" and two. I will write the "one ten" to the left of the figure 1, as you see. Can you write "one ten" and one, Annie? *A*. I think I can. (Writes.) *T*. That is right. Now, James, can you write ten, that is, "one" ten? *J*. I must write the figure 1 to the left, but I do not know what to write to the right of the figure 1. *T*. How many more than ten splints have you? *James*. I have no more than ten. *T*. Then, to show that you have no more than "one" ten, you must write this—it is called "zero"—to the right of the figure 1. Now write ten and six. That is correct. Now change the word "ten" into "teen," and say six before it. *James*. Sixteen. *T*. Please write ten and nine, Jennie. What may we say instead of ten and nine? *J*. Nineteen. *T*. Now write ten and ten, Jennie. *J*. Ten and ten is "two tens." Must I write the figure 2 to the left and 0 to the right? *T*. That is just what you must do. (Jennie writes.) *T*. We said twelve instead of ten and two, so we say "twenty" instead of "two tens." Please write "two tens" and three. What other name will do? *J*. I think we can say twenty and three. *T*. Yes; twenty and three, or, because it is a little shorter, "twenty-three." (New names thus introduced should always be written on the board, and fixed in the child's memory. The pupil should, therefore, write these names as often as necessary.)

**"Carrying."** *Teacher*. Please add the first column of this problem. What is your answer, Mary? *M*. It is fifteen. *T*. What can you say instead of fifteen? *M*. "One ten" and five. *T*. Where are the two figures, 1 and 5, to be placed?

*M.* Perhaps the figure 5 should be placed under the *first* column, and the figure 1 under the *second*. *T.* Why do you think so, Mary? *M.* The second column is a column of "tens" (the pupil has learned this before), and the figure 1 is "one ten." *T.* That is a good thought, Mary; but instead of putting the "one ten" down at once, "carry" it over into the second column, and add it to the sum of the second column. *M.* That makes "eleven tens." *T.* Now, what will you do with the "eleven tens," Mary? *M.* "Eleven tens," or "ten tens" and "one ten," is the same as "one hundred" and "one ten." (This fact was learned in a preceding lesson on notation and numeration.) I must write the "one ten" under the "tens" column, and the "one hundred" to the left. *T.* Have you a "hundreds" column to add? *M.* No, sir. *T.* What right have you to write "one hundred" to the left of "one ten" in your answer? *M.* I think it must be put there because it would be put there if we *had* a "hundreds" column to add. *T.* You have answered correctly. We must now try a problem with a "hundreds" column in it. Please work these three problems (constructing them) for your afternoon recitation. (Speed-drills should usually follow.)

**"Borrowing."** *Teacher.* Please read this problem (pointing to the board), Florence. *F.* From 609 take 235. *T.* The class may work it. Please go to the board (They work). (Seeing that the class hesitates after "5 from 9 leaves 4") What is the trouble, Frank? *F.* There is no "ten" from which to take "three tens." *T.* What do people sometimes do to get money to pay a debt? *F.* Father borrowed money from Mr. Jones to pay for our wagon. *T.* Suppose, then, that you "borrow" "one" from our zero's left neighbor. How many "tens" is the borrowed "one" worth? *F.* It is equal to "ten tens." (This was learned in preceding lessons on notation and numeration.) *T.* What can you do now? *Grace.* Three from ten leaves seven (putting it down). *T.*



Can you all work your problem now? (They work, but Frank forgets that he borrowed "one" from neighbor "six.") *T.* How did you get "four" as your last figure, Frank? *F.* I took two from six, and had four left. *Emma* (raising her hand). Frank should have said "two from five." (Frank, seeing his error, makes the necessary correction.) *T.* Please solve the following problems (writing them), and bring them this afternoon. (Speed-drills in adding and subtracting should follow. The teacher should encourage self-dependence in these young workers.)

**The "Three Times" Table.** *Teacher* (standing at the board). How many times have I written the figure 3, George? *G.* Only *one* time. *T.* Then one time 3 is how many? *G.* One time 3 is 3. *T.* I will write what you said (writing  $3 \times 1 = 3$ ). *T.* How many times have I written the figure 3 now? *Class.* Two times. *T.* Please *add* the two 3's. How many does it make? *C.* Six. *T.* Then 2 times 3 is how many? *Newton.* Two times 3 is 6. *T.* Please write it under ( $3 \times 1 = 3$ ). (Newton writes ( $3 \times 2 = 6$ ).) Can you now take 3 three times, and write it down? Four times, etc.?

Taught in this *constructive* way, the multiplication tables will be understood, and can be readily reproduced by the pupils. These reconstructions should, of course, be required. The pupil should *speak* as well as *write* the tables, until it can be done very rapidly, "forward" at first, and then "backward." When these things have been done (by adding and subtracting), the tables should be *drilled* into "memories," *i.e.*, they should be made "automatic." The figures from 1 to 12 may be arranged in a circle (the "table-figure" in the centre), for drill. This is the trying stage in the mastery of a multiplication table, but the work must be done if the tables are ever to serve their purpose, namely, economy in multiplication and division. *Problems* involving the tables as far as known

should be assigned in great numbers, until the tables become permanent and serviceable possessions.

**Multiplying.** Where to place the multiplier, with which figures to multiply in order, and how to place the partial products, must be taught, as in the preceding lessons, by observation of examples, thus requiring induction in order to think the "rule" and deductive exercises to fix it. The *reasons* for the steps can be taught a little later by generalizing the concept of "place" in notation. (The methods-student should be required to write out the recitations as illustrated.)

**Dividing.** Where to place the divisor, dividend, and quotient, how to proceed in short division, how to proceed in long division, and how to use the multiplication tables in division, and how to do whatever else must be done, must be taught in the same way as above. It is believed that "long" division is more complex than "short" division, and that it should, therefore, be introduced a little later. The teacher should work the same problem both ways side by side on the board, so that the pupils can see that long and short division are simply two modes of getting the same result. The divisor in this *contrast* of long and short division should be less than 10 at first. (The methods-student should be required to write out the recitation.)

*Speed-Drills in the Four Operations.* Among the most important deductive exercises in arithmetic are speed-drills, *i.e.*, practice in rapid adding, subtracting, multiplying, and dividing. The ability to perform these operations rapidly without mistake is a great practical advantage.

(1) The ability to add rapidly without mistake is probably the least common and the most important. Pupils should be taught to add by 2's, 3's, 4's, 5's, 6's, 7's, 8's, etc., and then irregularly. These drills should sometimes be conducted without the aid of figures, and sometimes with figures.

(2) Finding the sum and difference of any two numbers is

an excellent exercise for the development of arithmetical speed. In these exercises the teacher may proceed in two ways: (a) He may write some number, as 7, on the board, and then name other numbers, as 4, 3, 6, etc., expecting the pupil or pupils to tell the sum and difference at once. (b) He may name two numbers each time, as 5 and 8, expecting the pupils to say 13, 3, at once. At first the answers may be given in sentences, "The sum of 5 and 8 is 13; the difference is 3."

(3) Four columns of figures headed  $+$ ,  $-$ ,  $\times$ , and  $\div$  respectively, all beginning with 1 and ending with the figure to which the class has reached in multiplication and division, should be used as a speed-drill in the four operations. When, for example, the class has studied the "9 times" table, the columns should be written thus:

$+$	$-$	$\times$	$\div$
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
5	5	5	5
6	6	6	6
7	7	7	7
8	8	8	8
9	9	9	9

The teacher points to any figure in any column, avoiding "remainders," and the pupil or pupils at once name the sum, difference, product, or quotient.

The "Fraction" Concepts. *Teacher.* What have I done, Mary? *M.* You have broken a stick of candy into three pieces. *T.* Please hold the pieces side by side. What is true, class? *C.* The pieces are alike. *T.* What may we call one of the three "equal parts" into which the candy was broken, Paul? *P.* A three-part. *T.* Yes; a three-part, or a *third*. How

many thirds do I hold up now? *P.* Two thirds. (Similar questions should be used with other divisions, cuts, breaks, etc., until the pupil sees how to name the parts, and why.)

*Teacher.* What might we call one or more equal parts of a thing? (No one can tell.) One or more of the equal parts of a thing, is called a Fraction. James, what is a fraction? The class may think of three-fourths. Jane, can you show me three-fourths of this apple (handing her a knife)? Harry, please take these beans and arrange them in four equal heaps. How many beans are there in all? How many are there in each heap? What may we call one of these equal heaps of beans? Then, what is one-fourth of twelve? Three-fourths? How many fourths are there in all?

**The "Terms" of a Fraction.** *Teacher.* What is one of the four equal parts of this apple called, Ralph? *R.* One-fourth. *T.* Please write the word on the board. (Ralph writes "one-fourth.") *Teacher.* Let me write it. (Writes it thus ( $\frac{\text{one}}{\text{fourth}}$ ) at first, and then  $\frac{1}{4}$ .) Into how many parts have I divided this apple, class? *C.* Into four parts. *T.* Which figure shows it, Clara? *C.* The figure 4. *T.* That "4" is called the Denominator (writing the word). What does the denominator show, James? How many parts do I hold in my left hand? *Class.* One. *T.* Please point to the figure which shows how many parts I have taken. (Ralph points to the figure above the line.) *T.* That "1" is called the Numerator. Nell, what is the numerator of a fraction? (Many drills will be necessary to make the terms learned permanent possessions of the pupil's understanding and memory.)

**Two-Thirds and Four-Sixths.** *Teacher.* Into how many equal parts have I divided this circle (pointing to it)? What is one part called, Herbert? *H.* One-third. *T.* What are two parts called? *H.* Two-thirds. *T.* Please divide each third into two equal parts. How many parts are there in all? What is one of your six equal parts called? How many

sixths are there in two-thirds? How many thirds can you make out of four-sixths? Six-sixths? (In all these lessons—and there should be many with many variations in the means—the pupil should be conducted from the concrete to the abstract, and from the simple to the complex.)

**Two-Thirds of Three-Fourths.** *Teacher.* Please draw a square, and divide it into four equal parts, Bessie? What is one of your parts called? Now divide each fourth into three equal parts. How many parts are there in all? What is one of these small parts called? What part of one-fourth is one-twelfth? How many twelfths does it take to make two-thirds of one-fourth? Two-thirds of three-fourths? I will now show you how to get the same answer with figures. What have I done, Walter? *W.* You have multiplied the numerators, 2 and 3, together and written the 6 as a numerator. *T.* And now? *W.* You have multiplied the denominators, 3 and 4, together and written the 12 as new denominator. *T.* What can I do to make the six-twelfths one-half? *W.* Divide both numbers by 6. (By and by, but not at first, the device of cancelling should be introduced into such problems.)

**Division by Fractions.** *Teacher.* If James can drink two pints of milk a day, how many days will it take him to drink six pints, Jacob? *J.* It will take him just three days. *T.* How did you get your answer? *J.* I divided 6 by 2. *T.* Then, if James could drink only a half-pint every day, how must you reckon out how long it will take him to drink the six pints? *J.* I must divide by one-half. *T.* Please try it. (James knows how to divide 6 by 2, but cannot divide 6 by  $\frac{1}{2}$ .) *T.* Let me show you, James. This is the problem (writes  $6 \div \frac{1}{2}$ ). It must be written thus (writes  $\frac{6}{\frac{1}{2}} \times \frac{2}{2} = \frac{12}{1}$ ). What did I do to get the 12? *J.* You turned the divisor ( $\frac{1}{2}$ ) upside down, and did what must be done in multiplication. *T.* Yes; I “inverted” the divisor, and proceeded as in multiplication. What then must we always do when the

divisor is a fraction? You may all go to the board. Please divide seven by three-fourths. (Other exercises must, of course, be added.)

The reason for "inverting" the divisor when it is a fraction is too difficult at this point; it is a question of "reciprocal relation," and requires abstract reasoning. But by and by the pupil must be led to see that if, for example, one (3-thirds) contains one (3-thirds) just one time, it must contain 2-thirds as often as 2 is contained into 3, or  $\frac{3}{2}$ ; that the "inversion" of the divisor ( $\frac{2}{3}$ ), is the "quotient" of unity divided by the fraction; and that this quotient must be *multiplied* by 6 to get the whole quotient.

**The "Decimal" Concepts.** *Teacher.* Emily, what is one of ten equal parts of anything called? *E.* One-tenth. *T.* Please write it with figures. Let me show the class another way of writing  $\frac{1}{10}$ . (Writes .1.) What have I done? *George.* You wrote the figure 1 with a dot before it. *T.* The dot stands for the 10 in  $\frac{1}{10}$ , and is called the Decimal point. Please read this (pointing to .3). *Frank.* I think it is three-tenths. *T.* Is three-tenths a whole number? *F.* It is a fraction. *T.* What, then, may we call the "3" with a *decimal* point before it, Helen? *H.* A decimal fraction. *T.* Please read this (writing .12). *James* (after a little silence on the part of the class). The one is one-tenth, but I do not know what to call the 2. *T.* If the decimal point before one figure stands for 10, for what must it stand before two figures? (The class comes to a dead halt, and the teacher must tell them that before two figures the decimal point stands for 100, before three figures for 1000, and that therefore .12 is read 12 hundredths, and .235 two hundred thirty-five thousandths. A little more drill will fix the mode of decimal notation and numeration.)

The next lesson introduces the decimal operations, the teacher working examples, showing where to place the decimal point,

until by induction the pupils learn the "rules." The best motto in all these lessons is to "make haste slowly," since, as the teacher well knows, percentage problems require absolute mastery of the decimal operations.

**The Denominate Numbers.** (1) Every table should be built up concretely, *i.e.*, by actual measurements. When, for example, the pupil has seen that 2 pints make a quart, 8 quarts a peck, etc., the observations may be arranged into tables. These tables must, of course, for the sake of economy, be committed. This work is not difficult if the tables are properly built. (2) Playing "store" is a most interesting and effective way of combining a number of tables into practical use. (3) The denominate operations are to be taught by the development method, the teacher working examples and asking such questions or adding such explanations as may help the pupil in his inductions. Plenty of practical work should be assigned, and the work should include both common and decimal fractions, though, of course, in the elementary course, all the operations should be simple enough for the pupil's present powers. (The methods-student should be required to teach illustrative lessons.)

It is not supposed even for a moment that every teacher will develop a concept or a rule in just the same language or the same syllogisms, but all can work out the development ideal.

## II. INTERMEDIATE ARITHMETIC.

The intermediate course, *i.e.*, the course of remoter relations (see page 247), belongs for that reason to the period of life commonly called the "Grammar School" period. It should extend from the age of about eleven years to that of fourteen. The special features of intermediate arithmetic fall naturally under the following heads: (1) The Ends in View; (2) The Methods of Instruction; (3) The Order of Subjects; (4) Written Arithmetic; and (5) Mental Arithmetic.

**The Ends in View in Intermediate Arithmetic.** The things to be accomplished in the course of intermediate arithmetic are as follows: (1) Great proficiency in the subjects taken up in the elementary course, and (2) Advancement to such subjects as by reason of their greater complexity afford harder discipline and such as are necessary in the expanded and still expanding life of the pupil. These points are so obvious that they require no extended development, and will be assumed in the following pages.

**The Method of Instruction in Intermediate Arithmetic.** The nature of the new subjects to which the pupil is to be introduced in intermediate arithmetic requires, as was explained (see page 247), no new method; but, since arithmetic is to be developed into a useful art, *deduction*, the form of reasoning that applies general truths to the details of life, must be allowed to predominate over induction. The opportunity for deductive reasoning, as was pointed out (see page 247), is very great. Two topics deserve our special attention at this time: (1) The Development of Concepts, Rules, and Axioms; and (2) The Derivation of Principles and Rules.

*The Development of Concepts in Intermediate Arithmetic.* Such concepts as ratio, proportion, percentage, progression, involution, and evolution, must obviously be developed by observation of examples, consequent induction, and proof deductions.

*The Development of Rules in Intermediate Arithmetic.* Pupils in arithmetic should seldom, except in mensuration and several other cases, be allowed to work "by rule." Work "by rule" is almost certain to dwarf the analytic habit so desirable in good thinking. Therefore, rules in intermediate arithmetic, with the exceptions as stated, should be developed as before by analytic observation of examples and such induction as will always look for variations in new problems.

*The Development of Axioms.* Axioms are generally defined



as self-evident truths. The belief has prevailed that axioms are absolutely *a priori* truths, *i.e.*, truths at which the mind arrives without the inductive process. This conclusion is probably incorrect. It is altogether likely that axioms differ from other general truths only in this, that they are obviously undeniable and universal. Induction is, however, as it appears, their real origin, though the wonderful thing about these inductions is the "reach" to which the young mind arrives so early in life. Indeed, the axioms of arithmetic are all present in the child's mind before "lessons" begin. Take, for example, the axiom that "The whole is greater than any of its parts." Somewhere in childhood, nobody knows when, the mind virtually thought the subjoined syllogism :

"This whole is greater than any of its parts ;  
This whole is a sample of all wholes ;  
Therefore, any whole is greater than any of its parts."

But, although the child has probably arrived at all the axioms of arithmetic by induction long before it could state the syllogism, it is obviously a splendid discipline for an intermediate pupil to illustrate the origin of the various axioms and to state the syllogisms in which they are the conclusion.

*The Derivation of Principles.* Principles, as was shown on page 245, *can* be developed by induction, as in the case of factoring, and *should* be so developed ; but, as a most effective discipline, they should also be derived from axioms, *i.e.*, they should be demonstrated, or proved, deductively. Take, for example, the principle that "Dividing the denominator of a fraction by any number multiplies the value of the fraction by that number." This truth should first be illustrated in the concrete, and developed by induction ; but it should then be referred to the axiom one of whose derivatives it is, and proved by deductive reasoning. The principle in question rests on the axiom that "A whole is the sum of all its parts."

Dividing the denominator by any number is the same as dividing a whole into fewer parts, each of which must also be the sum of the smaller parts that would have been the results of dividing the whole by a larger number, and the larger parts must obviously be as much larger as the number by which it was proposed to divide the denominator. Accordingly, "Dividing the denominator, etc." The principles of the "four" operations, and those of fractions and factoring, should be thus proved in intermediate arithmetic. Much of this work of deduction, of course, cannot be done before the high-school period.

*The Derivation of Rules.* It is a great satisfaction to the mind, and a great practical advantage, to be able to show that rules can be gotten from principles, just as principles can be derived from axioms; and a still greater conquest, to be able to get original rules from given principles. Take, for example, the rule for finding the "greatest common divisor" of fractions. The rule should be developed "by trial," *i.e.*, by observation and induction; but it should also be deduced from the principle that "Dividing the numerator of a fraction, or multiplying its denominator, by any number, divides the value of the fraction by that number." Suppose the fractions to be  $\frac{2}{4}$ ,  $\frac{4}{6}$ ,  $\frac{6}{8}$ , and  $\frac{8}{10}$ . The "greatest common divisor" is wanted, *i.e.*, the largest number that will divide *all* the fractions exactly. How shall it be done? Referring to our principle, we are told how to proceed in case of *one* fraction; we must divide the numerator and multiply the denominator. Having treated all the numerators "by trial," we find the greatest *common* dividing number to be 2. The "least common multiple" of the denominators must, according to the stated principle, be the divisor wanted, since it contains *all* the old denominators, *i.e.*, divides them exactly. Therefore, in the proposed problem the G. C. D. is  $\frac{2}{12}$ . Much of this work of deduction must, by reason of the dependence of arithmetic on geometry and algebra, be deferred to a later

course in arithmetic. Such is the case with the rules of measurement. Many rules, such as those of fractions, etc., can, however, be referred to principles even in intermediate classes.

**The Problems of Intermediate Arithmetic.** The problems of intermediate arithmetic should, in accordance with the ends in view, be complex enough for higher discipline, and practical enough for the ends of life. Intermediate pupils should be required to work problems with very little aid from anybody, to state solutions in the best forms, and to explain the problems in strictest logic. These requirements are applicable to both written and mental arithmetic.

**The Order of Subjects in Intermediate Arithmetic.** Those operations in which the conceptions are complex, and the relations somewhat remote, are the subjects of intermediate arithmetic. They are, as was shown in the beginning of this chapter, higher forms of the elementary conceptions and processes. The logical dependence of subjects in arithmetic determines their true order of presentation in text-books and lessons. In practice the order of subjects is determined by the adopted text-book. The arrangements of Brooks, Hull, and Prince, are possibly as satisfactory as any.

#### a. WRITTEN ARITHMETIC.

The special features of written arithmetic fall under the following heads: (1) Problems; (2) Answers; (3) Assignment of Lessons; (4) Preparation of Lessons; and (5) Recitation. These topics deserve attention in all the courses of arithmetic, but are most conveniently treated in intermediate arithmetic, since mental and written arithmetic are first separated in this course.

**The Problems of Written Arithmetic.** The distinction between written and mental arithmetic is pointed out on page 275. (1) Discipline is their common aim, and the problems under the various rules should be so *varied* in conditions

that they cannot be solved by any mechanical "the-rule-says-so."

(2) Skill in computation, *i.e.*, brevity of statement and speed in calculation, is the special aim of written arithmetic. The *number*, therefore, as well as the *variety* of problems under each subject, should be adapted to this special purpose. When the number of problems in the adopted text-book is not adequate—and this must often happen—*supplementary* problems must be provided. The proficient teacher will have no trouble in the performance of this duty; teachers of all grades will find the books of Dr. John T. Prince (Arithmetic by Grades) very suggestive and helpful.

**The Answers to Problems in Written Arithmetic.** Authors of written arithmetics seem to believe that the answers of problems should accompany the text, or, if not that, they should at least be found in an appendix. Many teachers approve of such text-books.

This position is open to grave objections. (1) Pupils will work for the answer, and, having obtained the given answer, they will not take the trouble to *prove* it. Of the two habits thus formed, that of depending on others is a poor preparation for life, and that of neglecting to prove truth is positively dangerous. (2) It is certainly possible to do without such answers. This has been practically demonstrated in the case of mental arithmetic, where they are seldom found and rarely desired. Moreover, pupils trained into the habit of proving their own answers from the beginning, will not need such make-shifts, while, at the same time, they are forming the valuable habits of self-dependence and truth-seeking. It is, therefore, to be lamented that our school arithmetics contain such objectionable helps.

The question arises, Why do our authors give these answers, and why do many teachers want such books? The answer consists of two items: (1) Authors are required to give such

helps because the mass of teachers demand it; and (2) The demand grows out of the feeling of *dependence* which, through this very blunder in text-books, has become the habit of so many teachers. Moreover, teachers suppose it to be a "saving of time and labor" to have such books. This attitude of teachers reveals a misconception of the teaching-process which is indefensible, except in novices. Where books containing answers have been adopted, the teacher should do the best he can to ignore them.

**The Assignment of Lessons in Written Arithmetic.** The pupil should know just how much ground he is expected to cover. Definite requirement is a stimulus in the preparation of lessons. Such suggestions and preparatory drills as will put the pupil on the way to help himself, should be connected with the assignment of lessons. If the same lesson can be assigned to a number of pupils, the stimulus of definite assignments will be very effective, and the necessary suggestions will do for the many as well as for one pupil. Generally it will be found best to assign the next arithmetic lessons at the *close* of recitations. The teacher will then know just what hints, directions, and helps, may be needed. In order to succeed in these matters, the arithmetic teacher must evidently study every lesson every time he teaches it, even if that be a hundred times. It is not possible for any ordinary human being to *remember* the snags, switches, and pitfalls from year to year, so well as to be able to dispense with *thinking* the problem over every time.

**The Preparation of Lessons in Written Arithmetic.** The lessons should never be so long as to make it impossible to work all the problems, or at least all the doubtful ones. In case of younger pupils, it is safest to require all problems to be worked and offered for inspection; in the case of older pupils, successful recitation may be taken as sufficient evidence of preparation. As a moral precaution, younger pupils should

work their lessons in school hours and under the teacher's eye; older pupils should be required to do some work out of school hours. In all cases, the teacher should strive to cultivate self-dependence in his workers.

**The Recitation in Written Arithmetic.** The characteristics of a recitation in arithmetic can be most conveniently considered under the following heads: (1) The Objects of the Recitation; (2) The Preparation of the Board; (3) The Assignment of Problems; (4) The Working of Problems; (5) The Pupil's Explanation; (6) Criticisms; (7) The Teacher's Part in Problems; (8) Attention to the General Truths of Arithmetic; and (9) The Importance of Reviews.

*The Objects of the Recitation.* The objects of a recitation, whether it be in arithmetic or any other branch, are as follows: (1) To stimulate the pupil to study; (2) To exercise all the functions of the pupil's mind; and (3) To develop the subject in question. In short, every lesson should count as so much discipline and as so much progress in the subject.

*The Preparation of the Board.* At a given signal, the pupils should "prepare the board," *i.e.*, they should carefully erase whatever interferes with the purpose of the recitation, and write their names at the head of the board. After these preliminaries, the pupils should face the teacher and wait for assignments.

*The Assignment of Problems.* In case of younger pupils, the same problem should be assigned to the whole class by dictation. The teacher should see to it that the pupils do not "copy" in working the problem. In case of older pupils, a different task should be assigned to every pupil. The ideal way of assigning problems is to write them on prepared slips of paper, together with the number of the problem and the page of the book from which it may be taken, and to distribute the papers by lot. This plan is, however, not always practicable. In such cases, the problems may be assigned by

dictation, or by number and page. If no book is allowed at the board—and that is best when books contain answers, or when the class is small—the pupils should be taught to record the conditions of the dictated problem in some “short-hand” way. If books are used at the board—and this is allowable when the class is very large, when the books do not have the answers, or when the pupils are adults—the problems may be assigned by number and page. The number and page by which the problem was assigned should be written over the pupils’ board for the convenience of the teacher and the class.

*The Working of the Problems.* The pupils should be taught to do beautiful as well as correct and rapid work at the board. Precision and system are of great importance. Points, symbols, lines, figures, etc., should, accordingly, be strictly correct, and problems should be arranged as well as possible. No communications should be allowed between workers. A quiet, courteous, and natural dignity should be cultivated.

*The Pupil’s Explanation of Problems.* As soon as a pupil has worked his problem, he should quietly take a seat, or wait for new orders from the teacher. When all, or nearly all, the workers have done their work, the problems should be explained by the pupils. These explanations should be clear, concise, and logical. The pupil explaining should stand erect at the board, facing the teacher and the class as much as possible, holding the pointer in his right hand, and allowing the left hand to drop at his side. The habit of speaking earnestly, distinctly, and persuasively should be developed in these explanatory exercises. The explanations, as was pointed out, are of the highest importance to the pupil. The rest of the class should be required to listen very attentively. This requirement is a valuable stimulus, since it causes “comparison” and converts every pupil into an adjutant teacher.

*Criticisms.* The pupil’s work and explanation must often be supplemented and criticised. The whole class must be

ready for such additions and criticisms. This exercise is of the highest importance to the discipline and instruction of all.

*The Teacher's Part in Problems.* It may be necessary to offer suggestions to workers at the board, and to give directions to those who seem to be unable to proceed. The right time for such help must be determined by the circumstances. The teacher should not work problems for pupils, except as a last resort, and even then it may be better to work another problem that involves the same principles. Sometimes it is well to let pupils try for several days to do a problem, the teacher offering such hints as may seem in place. The teacher should supplement and criticise the pupil's explanation of problems, and add such information as may create interest in arithmetic.

*Attention to the General Truths of Arithmetic.* The impression seems to prevail that the great thing in arithmetic is "to work and explain problems." The whole truth is, that definitions, rules, principles, and axioms must be taught in connection with problems. But these general truths of arithmetic should be developed by induction or derived by deduction, as the case may be, in accordance with the methods already described, nor should any "text" statements of such truths ever be committed unless they are understood. The pupil's own statement, the immediate evidence of his own thinking, is to be generally preferred. Much of this work is most conveniently connected with the assignment of lessons and reviews.

*The Importance of Reviews in Arithmetic.* There should, of course, be formal reviews once a week or once in two weeks, and monthly tests. Every truth ever learned, and every power of computation ever acquired, should thus become permanent possessions. In addition to these formal reviews and tests, every recitation should consist partly of reviews and tests. Such connections will not only stimulate thorough preparation and private review, but serve as introductions to advances.



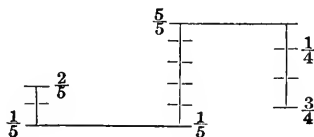
In these reviews no help should be offered except in extreme cases. The teacher needs excellent judgment in these, as in all cases.

### b. MENTAL ARITHMETIC.

The special features of mental arithmetic are most conveniently studied under the following heads: (1) The Nature of Mental Arithmetic; (2) The Preparation of Lessons; (3) The Recitation in Mental Arithmetic; and (4) The Importance of Mental Arithmetic.

**The Nature of Mental Arithmetic.** Mental arithmetic is so named, not because written arithmetic is only a physical process, but because in mental arithmetic the "number-operations" are performed without the aid of "figures." The real difference between these two species of arithmetic is this, that mental arithmetic is eminently analytical and inductive, while written arithmetic lays more stress on economic abridgments and deductions. These distinctions between mental and written arithmetic may be understood by comparing the two modes of solving a problem. Take, for example, this problem: If  $\frac{2}{5}$  of a pound of butter costs 10 cents, what will  $\frac{3}{4}$  of a pound cost?

*The Solution in Mental Arithmetic.* If  $\frac{2}{5}$  of a pound of butter costs 10 cents,  $\frac{1}{5}$  of a pound will cost  $\frac{1}{2}$  of 10 cents, or 5 cents, and  $\frac{5}{5}$ , or 1 pound, of butter will cost 5 times 5, or 25 cents. If 1 pound of butter costs 25 cents,  $\frac{1}{4}$  of a pound will cost  $\frac{1}{4}$  of 25 cents, or  $6\frac{1}{4}$  cents, and  $\frac{3}{4}$  of a pound will cost 3 times  $6\frac{1}{4}$  cents, or  $18\frac{3}{4}$  cents. The analytic-synthetic steps of the solution may be represented in the following drawing of physical steps:



*The Solution in Written Arithmetic.* If  $\frac{2}{5} = 10$ ,  $\frac{5}{5} = 25$ , and  $\frac{3}{4} = 18\frac{3}{4}$ ; or,  $\frac{2}{5} : \frac{3}{4} = 10 : \text{answer}$ ; therefore,  $\frac{5}{2} \times \frac{3}{4} \times \frac{10}{1} = 18\frac{3}{4}$ . Whether solved by fractions or proportion, the economic abridgments and the deductive reasoning are obvious. In the solution by mental arithmetic the *analysis* of the problem allows no abridgments, and is the first step in the *induction* of rules.

**The Preparation of Lessons in Mental Arithmetic.** As far as possible problems should be written out before the recitation. At all events, every problem should be "thought out" by analysis. The teacher and the pupils are equally subject to this requirement. The lessons must, of course, be short enough to make such preparation possible.

**The Recitation in Mental Arithmetic.** Various methods have been proposed and used. Among the best ones are the following :

*The Common Method.* The teacher reads a problem, assigns it to some pupil, and requires him to rise, repeat, and solve it without the help of a book or figures. It is necessary to insist on precise and concise language, and correct pronunciation. The method is economic, and, in the hands of a strong teacher, will be effective.

*The Chance Assignment Method.* The number of the problem and the page of the book from which it may have been taken are put on prepared slips of paper, and the pupils draw papers by lot. The teacher reads a problem, announces the number and page, and expects the pupil that drew the number to rise and then repeat and solve the problem as in the common method. This method is superior to the common method as an exercise in attention.

*The "Parts" Method.* The teacher reads and assigns as in the common method ; but when the first pupil has repeated

the problem he may assign it to another pupil, who, after partly solving it, may pass it to another, etc., until finally it has been fully solved. The method is effective with younger children as a means of holding their attention, and may be used for variety in connection with other methods.

*The Silent Method.* The teacher reads a problem as in the common method, the whole class tries to solve it, and when time enough has been allowed, some one is requested to rise, repeat, and solve, as in the common method. This method is good for variety, and with younger pupils, but requires a great deal of time.

*Board Work in Mental Arithmetic.* In connection with any of the preceding methods, some pupils should be required to work questions on the board. These questions should be assigned by means of slips of paper on which they have been copied beforehand. Such board-work is a good opportunity to introduce supplementary problems and reviews. Written solutions in mental arithmetic develop accuracy in thought and language. The language as well as the thought should be criticised.

**The Importance of Mental Arithmetic.** The method known as "mental" arithmetic has the following merits: (1) It is a superior means of mental discipline, and (2) It is a very desirable equipment for life.

*The Discipline of Mental Arithmetic.* (1) Inasmuch as mental arithmetic is analytic and inductive, it is a fine training in logic. (2) Since the problem must be repeated and solved without a book, attention and memory are brought into energetic exercise. (3) The analytic process of mental arithmetic requires precise and concise language, and thus adds one most desirable power to another. (4) The habit of analysis and induction, as developed in mental arithmetic, is the true complement of written arithmetic and the door to higher mathematics.

*The Practical Value of Mental Arithmetic.* In practical life there are many times when the powers developed in mental arithmetic are most serviceable. The man who is unable to solve questions of practical arithmetic without pencil and paper is often at a disadvantage.

*An Eloquent Plea for Mental Arithmetic.* "No words can convey a full appreciation of the importance of mental arithmetic. Only those who experienced the transition from the old methods to the new can fully realize the supreme value of the study. Indeed, we believe that the method of mental arithmetic is the greatest improvement in modern education; and the world owes a debt of gratitude to Warren Colburn, its author, which it can never pay. Though there has been a recent reaction in public sentiment against the subject, we believe that it is merely a wave of opinion and that it cannot be permanent. Mental arithmetic is the great source of discipline to the power of thought in our public schools. When properly taught, it gives quickness of perception, keenness of insight, toughness of mental fibre, and an intellectual power and grasp that can be acquired by no other primary study. To omit, therefore, a thorough course in mental arithmetic in the common schools, is to deprive the pupils of one of the principal sources of thought power."

### III. HIGHER ARITHMETIC.

The purpose in hand forbids an extended discussion of higher arithmetic. A mere outline is all that our limits will allow, and the outline is respectfully subjoined as a stimulus to teachers.

**The Ends in View in Higher Arithmetic.** The ends in view in higher arithmetic are as follows: (1) To supplement the grammar school course; (2) To study such remotest relations of arithmetic as can be better understood after a course in algebra and geometry; (3) To equip pupils with such

special training in arithmetic as shall serve special needs of life; and (4) To develop such historical, scientific, philosophic, and professional scholarship in arithmetic as may be deemed important.

**The Method of Instruction in Higher Arithmetic.** The development method, as employed in intermediate arithmetic, is virtually the right method for higher arithmetic. The higher phases of the subject, the special purposes in view, and the "personal element" of the teacher, must determine the necessary adjustments. The pedagogics of arithmetic is a problem in psychology and economy, and must, of course, be studied from those special stand-points.

**The Subjects of Higher Arithmetic.** The course of higher arithmetic belongs to the high school, normal school, business college, etc.

*High School Arithmetic.* The subject of arithmetic should not be dropped in high schools. It should be retained as a means of higher culture and special equipment. (1) From the stand-point of culture, a regular text-book should be supplemented with "test" problems. A course of mensuration should be added after geometry, the special purpose being to investigate the origin of rules and to acquire the power to make original rules. (2) From the stand-point of equipment, the high school should offer a course of commercial arithmetic in connection with book-keeping. A thorough course in the "Metric System" is desirable.

*Normal School Arithmetic.* The normal school should offer a course in arithmetic equivalent to that just mapped out for high schools. The special stand-point of normal schools requires such a course for two reasons: (1) As a preparation for the pedagogics of arithmetic; and (2) As an equipment in teaching arithmetic. The history and philosophy of arithmetic should be connected with the pedagogics of arithmetic. Discovery of principles and deduction of methods should be

the great aim. Old methods should be subjected to criticism, and original methods derived. A course in duodecimals is desirable for teachers and specialists in arithmetic.

#### IV. THE IMPORTANCE OF ARITHMETIC.

The importance of arithmetic is most conveniently considered under the following heads: (1) The Culture Value of Arithmetic; (2) The Instruction Value of Arithmetic; (3) The Practical Value of Arithmetic; and (4) The Training of Teachers of Arithmetic.

**The Culture Value of Arithmetic.** The detachment of quantity from quality at once distinguishes arithmetic from all other sciences. The measurement of quantities, and the expression of such measurements by means of "numbers," are the great concerns of arithmetic. The measurement of quantities makes analysis, synthesis, and comparison the necessary processes of arithmetic. The possibilities and applications of these processes must be ascertained by the development method of study. Thus we see that arithmetic exercises the mind in its most complex functions and within a sphere *sui generis*. The tendency of such exercise is to develop the power of attention in union with the syllogistic processes. But, although the "intellect" and "will" are thus exercised somewhat unfeelingly, the "heart" learns to rejoice in "truths." There is one danger in the study of arithmetic. "The Committee of Fifteen" refers to this danger as follows: "The study of quantity, if carried to excess, may warp the mind into a habit of neglecting quality in its observation and reflection. As there is no subsumption in the quantitative judgment, but only equality or inequality ( $A$  is equal to or greater or less than  $B$ ), there is a tendency to atrophy in the faculty of concrete syllogistic reasoning on the part of the person devoted exclusively to mathematics."

**The Instruction Value of Arithmetic.** The knowledge

of "numbers" is virtually equivalent to the intellectual measurement of the universe ; it permits the imagination to ascend and descend to the utmost limits of space, to estimate the forces of nature, and to fathom the ends of eternity ; it, therefore, emancipates the mind from its physical environments and lifts it into the atmosphere of infinities. The lesson of immortality, as Pythagoras saw, is forced upon the studious mind in arithmetic.

**The Practical Value of Arithmetic.** "The Committee of Fifteen" has this to say about the practical value of arithmetic : "It is the first tool of thought that man invents in the work of emancipating himself from the thralldom to external forces. For by the command of numbers he learns to divide and conquer. He can proportion one force to another, and concentrate against an obstacle precisely what is needed to overcome it. Number also makes possible all the other sciences of nature which depend on exact measurement and exact record of phenomena as to the following items : order of succession, date, duration, locality, environment, extent of sphere of influence, number of manifestations, number of cases of intermittence. All these can be defined accurately only by means of number."

**The Training of Teachers of Arithmetic.** The responsibility of teachers of arithmetic must be measured by the importance of the study. If arithmetic is as important to pupils as just explained, it is evident that teachers of arithmetic need the best possible training. This training consists of two items : (1) Training in arithmetic itself. This training is needed in the *art* as well as in the science of teaching arithmetic. Without such proficiency the teacher must be a "blind leader of the blind." (2) Training in the principles and methods of teaching arithmetic. Since this topic was the subject of the present chapter, it is hoped that the point in question may be evident without further study.

## CHAPTER IX.

## GEOGRAPHY.

THE first requisite in ideal instruction is a definite conception of the "subject" to be taught. In this chapter on geography we must therefore inquire into the nature of geography before we try to solve the problem of teaching geography.

## A. THE NATURE OF GEOGRAPHY.

The purpose of the chapter limits inquiry into the nature of geography to four topics: (1) The "Subject" of Geography, (2) The Psychology of Geography, (3) The Relation of Geography to Other Branches, and (4) The History of Geography.

**The Subject of Geography.** "Geography," as commonly defined, "is a description of the surface of the earth, and its inhabitants." The subject of geography, according to this definition, is (1) The earth's surface, and (2) The earth's inhabitants. The earth, however, is the subject of geography only in so far as it is the "home of man," and man only in so far as he is the earth's inhabitant. But the earth, as man's habitat, consists of land, water, atmosphere, plants, animals, minerals, and conditions of relation; and man, as the earth's inhabitant, is subject to changes, makes changes in his habitat, and employs it as means to ends. These phenomena, accordingly, constitute the "subject" of geography. This definite conception of geography is completely developed in Guyot's treatise on "The Earth and Man."

**The Psychology of Geography.** The "subject" of geography is capable not only of description, but also of explanation. Geography is, therefore, really a science. Strictly defined, *Geography is the science of the earth as man's habitat and*



*of man as the earth's inhabitant.* As a science, geography must first observe and then explain its phenomena.

*Observation in Geography.* Possibly there is no other science in which observers are so likely to trespass upon the domain of related sciences. The observer in geography should therefore keep in mind this absolute requirement, to observe the earth only as man's habitat, and man only as the earth's inhabitant. Within these bounds, however, the student must observe (with senses and judgment) every nook and corner of space and time, and record his observations. When original contribution to the science of geography is the end in view, perceptive observation is imperative; but, in the case of pupils of geography, perceptive observation must for obvious reasons be supplemented by conceptive observation.

*Explanation in Geography.* Just as cumulation is the first step toward construction in building a house, so observation is only the first stage in science. The cumulation of facts must be supplemented by explanation. In other words, the facts of geography must be referred to causes, laws, and classes. The process of geographical explanation begins with an *inductive* inquiry into the relations in question, and ends in *deductive* classification of phenomena. (See Principles of Knowledge.) Whether original contribution to the science of geography, or acquaintance with the constructed science, be the end in view, the explanatory process is essentially the same. The only difference between the geographer and the student of geography is this, that presumably the former is able to supervise his course, while the latter is a protégé of supervision.

*Species of Geography.* The subject of geography, as we have seen, lies partly in space and partly in time. The phenomena in question are therefore (1) Physical Phenomena, and (2) Historical Phenomena.

*Physical Geography.* The description and explanation of the physical phenomena of geography constitute *Physical*

*Geography, or Physiography.* Nature in the form of land, water, air, plants, animals, minerals, and man, as well as the planetary relation of the earth, is the subject of physical geography. Thus it follows that special problems of geology, meteorology, botany, zöology, anthropology, and astronomy, when viewed from the stand-point of geography, are also special problems of physical geography. Astronomical, or Mathematical geography, is often treated as if it were a third species of geography cöordinate with physical and political geography.

*Political Geography.* The description and explanation of the changes which man as the earth's inhabitant makes in his habitat, and of the uses to which he puts his habitat, constitute *Historical, or Political Geography*. Accordingly, political geography treats of man's divisions of territory, his modes of life, civilization, and activity, and the character of the governments which he establishes. Thus we see that certain problems of history, when viewed from the stand-point of geography, become special problems of political geography.

**The Relation of Geography to Other Branches.** Inasmuch as the earth is the subject of geography only in so far as it is man's habitat, and man only in so far as he is the earth's inhabitant, the relation of geography to other branches whose subject in some aspect or other is also the earth or man must be obvious. The earth, for example, is the subject of chemistry, but only in so far as it consists of "elements in composition." So, too, the earth is the subject of geology, botany, zöology, mineralogy, etc., but only in so far as it can be viewed from the special stand-points of these sciences. In the same way, man is the subject of various sciences, such as physiology, psychology, etc., but only in so far as he can be viewed from the special stand-points of these sciences. Thus it follows that while geography and many other sciences apparently have the same subject, they really have only certain as-

pects of this subject for their special domains. Two inferences are necessary : (1) Geography is an encyclopædic introduction to the various sciences whose subjects are aspects of the earth and man ; and (2) A knowledge of the sciences related to geography is requisite to a complete mastery of geography. (See the Tenth Principle of Knowledge.)

**The History of Geography.** For the first records of geography, we must look to the “nest places” of civilization, *i.e.*, to the fertile valleys and peninsulas about the shores of the Mediterranean Sea and the Persian Gulf. “Here the sailor, the traveller, the soldier, brought together their accounts of foreign lands, people, winds, ocean currents, and apparent motions of the heavenly bodies.” The ancient Egyptians and Phœnicians knew only the shores of the Mediterranean Sea. The Greek Homer (about 900 B.C.) knew Asia Minor, Phœnicia, and Egypt, but apparently was ignorant of Mesopotamia. “Herodotus (450 B.C.) had travelled through Asia Minor, Phœnicia, Lower Egypt, and Mesopotamia, which, with his own country, he has accurately described ; but he knew very little of the discoveries to the westward, and has not even mentioned Rome.” Alexander’s marches laid open the way to India. “Eratosthenes (276–194 B.C.) began at Alexandria to explore the heavens for the key to mathematical geography. He also studied the relation of irregular coast-lines to continental areas, together with the effects of great natural features upon climate, and used parallels and meridians in his maps to locate important places.” The Punic Wars and the campaigns of Julius Cæsar made known many countries. The greatest geographer of ancient times was Claudius Ptolemy (about 150 A.D.). If the claims be correct, Newfoundland, Nova Scotia, and Martha’s Vineyard were discovered about 1000 A.D. Then came Columbus, Vasco de Gama, and Magellan, completely overturning the Ptolemaic system, and forcing the scientific world to adopt the theory

of a solar system. "About 1556 a Flemish mathematician named Mercator constructed the first map of the whole world upon the projection which bears his name." Other projections, known as *conic*, *polyconic*, and *globular*, came later. Humboldt "was the first to teach geographers to indicate climate by means of isotherms; to divide the world into natural regions, basing the divisions upon natural features, for showing the distribution of life; to group the plants into a few great families, and refer them to climatic conditions." The great Ritter made geography "The Science of the Earth in Relation to Nature and the History of Man." He studied "the trends of the great mountain systems, the comparative areas of highlands and lowlands, the proportions of continental surfaces to coast-lines, the disposition of land and water areas, together with their influence upon climate, the distribution of life, and the intellectual development of the races." Arnold Guyot, a disciple of Ritter, has done much for geography in America. The earliest American text-books on geography were little more than catalogues of places, etc. By and by description and explanation were added. Among the most popular geographies of our times are Warren's, Butler's, Mitchell's, Appleton's, Frye's, and Redway and Hinman's. For a complete view of the history of geography, the reader is referred to Professor Frye's little book "The Child and Nature," from which most of the foregoing details are quoted.

## B. INSTRUCTION IN GEOGRAPHY.

Three great questions constitute the problem of teaching geography: (1) In what order and to what extent are the subjects of geography to be taught? (2) What method of instruction is appropriate to each course? and (3) How important is the study of geography to education? These questions will be discussed under the following heads: (1) The Necessary Courses in Geography, (2) The Elementary Course in Ge-

ography, (3) The Intermediate Course in Geography, (4) The Higher Course in Geography, and (5) The Importance of Geography.

#### I. THE NECESSARY COURSES IN GEOGRAPHY.

The subjects of geography should be taken up in the order of their dependence and complexity. (See Principles of Knowledge.) Progress from subject to subject, and phase to phase, should be adapted to the stages of the pupil's possibility. (See the First Principle of Instruction.)

**Complexity in the Evolution of Geography.** The order of dependence (see Principles of Knowledge) in the evolution of any subject is absolute. It must accordingly be the task of authors and teachers to discover and follow this order in their books and instruction. It also obviously devolves on authors and teachers to ascertain the stages of complexity in the evolution of a subject, and to proceed from the simple to the complex in teaching. (See the Third and Fourth Principles of Knowledge.) In geography, as in all studies, each subject has three distinct stages of complexity, (1) The stage of immediate relations, (2) The stage of remoter relations, and (3) The stage of remotest relations.

*The Stage of Immediate Relations.* The concrete phase of a subject is readily comprehended when the parts and qualities of that which is in question are few and their dependence obvious to the senses. The concrete phase of "slope and drainage," for example, is readily understood even by a child when the slope and drainage have no obscure parts. In such cases even the *law* can be taught to a child.

*The Stage of Remoter Relations.* Abstract phases of a subject are more difficult to comprehend, especially if the qualities of that which is in question are numerous and the relations can be illustrated only imperfectly. This is the case in the study of winds, tides, currents, coast-lines, commerce, government, etc. Even when we resort to illustrations, such as can be

given by means of relief globes, charts, etc., these subjects are too complex for children.

*The Stage of Remotest Relations.* Abstract relations of a subject are very difficult to understand when the parts and qualities of that which is in question enter into complex composition. It is a most difficult problem, for example, to study "the trends of the great mountain systems, the comparative areas of highlands and lowlands, the proportions of continental surfaces to coast-lines, the disposition of land and water areas, *together with* their influence upon climate, the distribution of life, and the intellectual development of the races."

*The Stages of the Pupil's Possibility.* The pupil's possibility is approximately measured by his capacity and opportunity (see the Fourth General Principle of Education), but there are general stages of possibility for every pupil, which determine what phase of a subject he should study. (See the Second, Third, and Eighth Principles of Instruction.) Stated in logical order, these stages are those of (1) Dependence, (2) Transition, and (3) Independence.

*The Stage of the Pupil's Dependence.* So long as the pupil needs supervision in the formation of his concepts and conclusions, he is a protégé in geography, and must be assisted by concrete guidance, as in object lessons.

*The Stage of the Pupil's Transition.* As soon as the pupil needs supervision only in case of complexities, or for reasons of economy, he is becoming independent, and must be required to shift for himself. Books, maps, etc., must now become regular means of supplementing his observations and reflections.

*The Stage of the Pupil's Independence.* When stimulus, rather than supervision, is all that the pupil needs, he must be thrown almost altogether upon his own resources. Advanced texts, atlases, cyclopædias, etc., must now become regular means, and the recitation is hardly more than a spur to original investigation.

**The Necessary Courses in Geography.** Thus it follows that the necessary courses in geography, as in other branches, are three: (1) The concrete course, in which the relations of the subjects are obvious, and much supervision necessary. This course is termed the *Elementary* course. (2) The course in which the relations of the subjects are less obvious, and supervision is less direct. This course is termed the *Intermediate* course. (3) The course in which the relations are complex and abstract, and the pupil has supervisory power. This course is termed the *Higher* course.

## II. THE ELEMENTARY COURSE IN GEOGRAPHY.

The topics which at this point deserve attention are the following: (1) The ends in view, (2) The lesson-method, (3) The subjects of elementary geography, and (4) Sample lessons.

**The Ends in View in Elementary Geography.** There are four ends in view in ideal instruction, (1) The development of concepts, (2) The discovery of facts, (3) Inductions, and (4) Deductions.

*The Development of Concepts.* Inasmuch as the subject of geography lies partly in space and partly in time, the first task in teaching geography is to develop in the pupil's mind such concepts of extension as position, direction, distance, hour, month, year, etc., and their signs (representation) on maps, globes, in books, etc. The neglect to perform this task always cripples the child's progress.

*The Discovery of Facts.* The ultimate object of science is the discovery of general truths, or principles; but this discovery is either unlikely or impossible when particular truths, or facts, have not been discovered by the learner. (See the Fifth Principle of Knowledge.) When, therefore, such general truths as *definitions* and *laws* are to be thought by the pupil, he should first think concrete cases.

*Inductions.* As soon as the pupil has discovered facts, he

is ready to think principles. Indeed, it must be obvious to any one who will think about it, that pupils are not only ready, but should be required to think the general (not necessarily the universal) as soon as they have thought the particular. When, for example, the pupil has discovered that *a* mountain is very high land, he should be led to think the definition, or general truth, of mountains; or, when he has discovered that *a* stream of water flows down hill, he should be led to think that all streams tend to flow down hill. The teacher that neglects such inductions really neglects to teach.

*Deductions.* Induction makes it possible for the mind to classify its acquisitions, and to know more individuals of a genus than one has ever studied. Such insight into genera saves labor and confusion in subsequent thought, inasmuch as new individuals can be readily classified by means of obvious specific properties. When, for example, the pupil has learned the principle that all the rivers of some particular slope flow into one bed, he needs to know only one thing about any new river, namely, that it belongs to that slope, to classify it correctly in other respects also. This ability to classify by deduction is the high prerogative of humanity, and the ultimate object of ideal instruction. When this power has been developed, science becomes art, and the learner, provided the power has also become habit, is "of age." (See Third General Principle of Education.)

**The Lesson-Method of Elementary Geography.** The tasks of elementary geography (see the preceding paragraph) can be accomplished only by requiring learners to study subjects with all the possible functions of the mind in logical succession. (See the Tenth Principle of Instruction.) This requirement is virtually fulfilled in what are conveniently termed *Inductive-deductive Lessons*. The conspicuous steps of an inductive-deductive lesson are as follows: (1) Perception, (2) Conception, (3) Representation, and (4) Explanation.



*Perception.* Inasmuch as the "subject" of geography lies partly in space and partly in time, the concrete quality of which in both cases is extension, *perception* is the natural basis of direct comparisons in geography. Apart from actual perception, these comparisons are likely to resemble "beating the air."

*Conception.* In the course of several direct comparisons, the mind, by "selecting agreements" (abstraction) and thinking them into unity (generalization), arrives at concepts, or general ideas. This complex process in its entirety is termed Conception. It implies memory as the means in holding fast experiences and names; and, in the form of imagination, it enlarges the mental horizon in geography, thus completing the mind's desired survey of space. The term *definition* denotes two things in this connection, (1) The process of conception itself, and (2) The description of a concept in words. These two things should be combined as much as possible in the order just given.

*Representation.* Since the "subject" of geography lies *extended* in space and time, these extensions can be physically represented. The most realistic representation of geographical knowledge are sand-moulding and clay-modelling, or relief globes; the most convenient, although the most abstract form of representation, are drawings termed Maps and Globes. The immediate purpose of representation in geography is (1) To stimulate observation, and (2) To supervise thought. The permanent function of maps and globes is (1) To record geographical observations, and (2) To serve, though imperfectly, as a substitute for observation of the "subject" of geography. At first only the simplest exercises should be required of pupils. These exercises should, however, be introduced as soon as sound sense dictates, and difficulties should be mastered as fast as judgment and constructive skill can be developed. Formal map-drills should follow map-making.

*Explanation.* The pupil should be required to think causes, laws, and classes, so far as he is able, in connection with perception, conception, and representation in geography. Causes, laws, and classes can often be understood by very young pupils, if the teacher's illustrations and questions are skilful. Nevertheless, the pupil should not be pushed beyond his "interest" in these matters. Indeed, description (perception, conception, representation) should predominate very much over explanation in elementary geography. Deductive exercises should be added in order to bring geographical knowledge into real life.

#### a. THE SUBJECTS OF ELEMENTARY GEOGRAPHY.

Elementary geography may begin the last part of the second or the first part of the third school year, and should cover about three years. The progress from subject to subject in elementary geography should at first be synthetic (starting at home), and, in due time, it should be analytic. (See the Second and Fifth Principles of Instruction.) The following outline suggests the work to be done, and the order in which to develop the subjects. The pupil should be required to study a simple book, such as Frye's "Primary Geography," the third year.

**Position.** Develop the concepts *above, below, before, behind, right, left, etc.* Place objects into the relations denoted by these terms, require the pupils to place objects into these relations, and have them locate objects in such relations.

**Direction.** Develop the concepts *East, West, North, South, etc.* Require some pupil standing in front of the class to point out and face the East, West, etc. Have the pupils locate objects, places, etc., in the East, West, etc. Place the pupils at various points in the room, and lead them to see the directions (1) from some central point (absolute direction), and (2) from each other (relative direction).

**Distance.** Develop all the concepts of linear measure, such as length, breadth, height, depth, etc. Lead them to know inches, foot, yard, rod, etc., by actual measurements. Require them to divide lines, strings, etc., into halves, thirds, etc. Have them estimate the length, breadth, height, etc., of the floor, blackboard, cellars, windows, etc., and then test the estimates by actual measurements.

**Representation.** Having acquired the ideas of position, direction, and distance, the pupil is ready to make *maps* of the table, floor, yard, field, etc., denoting positions, directions, and distances, by means of dots, lines, colors, etc. (See the First and Third Principles of Knowledge.) Lead the pupils to see that a line an inch long, for example, may represent an edge a foot, yard, or rod long. Begin these lessons by showing the children how to map the table-top on the black-board. Require them to map the table, floor, etc., on slates, board, etc., using the adopted "scale of measurement."

**Surface.** (1) Lead the pupils to distinguish *even*, *uneven*, *level*, and *sloping* surfaces. Require them to find such surfaces in the vicinity of the school-house and their homes. (2) Lead the pupils to distinguish *highlands* and *lowlands*. Develop in succession the concepts of the various species of high land, such as *hill*, *mountain*, *range*, *peak*, etc. Require the children to describe a hill, mountain, etc., introducing such terms as base, slope, summit, etc. In the same way develop the concepts of the various species of low land, such as meadow, valley, prairie, etc. If possible, imitate these forms in sand and clay. Use illustrative pictures. Require descriptions in which memory, imagination, and judgment are necessary. Identify these forms on maps, globes, etc. Lead the pupil to reflect on these forms.

**Water.** Lead the pupil to distinguish *streams* from *still* bodies of water. Develop in succession the concepts of the various species of streams, such as *creek*, *brook*, *river*, etc., to-

gether with their sources, banks, bed, current, etc. In the same way develop in succession such concepts as *pond* (together with *bay, strait*), *lake, sea, ocean, etc.*, together with their shores, bed, inlets, outlets, uses, etc. When possible, imitate these forms in clay and by means of the "geographical box." Use illustrative pictures. Give and require descriptions in which memory, imagination, and judgment are necessary. Identify all these forms on globes, maps, etc. Lead the pupil to reflect on such questions as (1) What kind of fishes live in the creek which you crossed this morning? (2) What causes the current in a stream? (3) Why do some streams flow faster than others? (4) Why is it hard for a fish to swim "up stream"? (5) What are rapids? (6) Why is sea-water unfit for drinking?

**Land and Water.** Teach other lessons on land and water in the way just indicated.

**Climate.** Develop the concepts of *temperature, moisture, wind, etc.* Lead them to distinguish climates as warm, cold, moderate, moist, dry, etc., and acquaint them with examples. Teach them to reflect on the causes of various climates, and lead them to see how climate affects health, plants, animals, products, habits, etc.

**Soil.** Require the pupils to handle *sand, shale, clay, loam, etc.* Help them to sow seeds and plant trees into the various kinds of soil, and thus lead them to distinguish soil as *fertile, barren, etc.* Require them to locate the various soils, and to reflect on their causes, such as slope, etc. Teach them some effects of soils on plants, trees, etc.

**Productions.** Having developed the conditioning concepts of climate and soil, lead the children to discover the simpler concepts, facts, and relations of the various productions, such as flowers, grasses, grains, vegetables, etc. The following details will suggest the work that can be done, and serve as a rough outline to be filled up as the teacher sees possible and

appropriate. (1) Require the pupils to name, distinguish, and locate the common grasses, grains, vegetables, fruits, trees, etc., and to study their habits, peculiarities, and uses. Tell them about the great prairies of the West, the rice-fields of the South, the potato of Ireland, the coffee of Brazil, the oranges of Florida, the trees of California, etc. (2) Require the pupils to name, distinguish, describe, and locate the common species of insects, birds, fishes, reptiles, and other animals. Familiarize them with the characteristic habits and uses of these animals. Give lessons on bees, spiders, butterflies, fireflies, grasshoppers, potato bugs, plant lice, birds' nests, migration of birds, food of birds, habits of fowls, fishes, frogs, snakes, monkeys, etc. Tell the children about interesting animals of other lands.

**People.** Familiarize the pupils with the industries of their community and neighboring localities. Require them to name these industries, the workers, their characteristic tools, products, etc. Lead the children to observe the buildings, dress, and manners of people, and require descriptions in which memory, imagination, judgment, etc., are necessary.

**Races.** Find opportunities to teach the races of man, describing them, studying their characteristics. Give lessons on the Indians, Negroes, Esquimaux, etc.

At this time, say the beginning of the third year, the pupil should be required to study a simple book, and greater stress should be laid on globes and maps, and the preceding lessons should be reviewed in connection with the following new subjects.

**The Form of the Earth.** Calling the pupil's attention to the *apparent* form of the earth (see the Second Principle of Instruction), lead him to think of it as round like a ball or an orange, etc. Develop such proofs as (1) People have travelled around the earth, (2) The horizon line is a circle, (3) The top

of an incoming ship is first seen, (4) Other proofs. (See Redway's "Manual of Geography.") Require pupils to think of such questions as the following: (1) Why do the ships that sail on the under side of the earth not fall off? (2) How does the inside of the earth look?

**Distribution of Land and Water.** Using relief globes, other globes, and maps, lead the children to observe (1) The surface location of land and water, (2) The contour of the continents, (3) The primary and secondary continental reliefs, (4) The drainage, (5) The relative proportion of land and water.

**Motions of the Earth.** (1) Develop the concepts of time, such as day, hour, minute, week, month, year, as in the exercises of arithmetic. Lead the children to see the use of watches and clocks. Tell them about sun-dials, etc. (2) By means of a candle and globe, or black ball with a knitting needle as the axis, teach the *rotation* of the earth on its axis, and its effect, *i.e.*, day and night. In the same way, teach the phenomena of the moon, and the lunar month. (3) With the same means, taking care to incline the axis properly, teach the *revolution* of the earth around the sun, the orbit of the earth, the effect of the earth's revolution and the inclination of its axis, *i.e.*, the seasons, polar days and nights, the location and names of the principal circles, the zones, together with their peculiarities of climate, products, people, etc. (4) After the above lessons, and somewhat in connection with them, teach the equator, latitude, longitude, parallels, meridians, degrees of longitude, etc. Require the pupils to find the latitude and longitude of certain places, to locate places whose latitude and longitude are given, to reckon out differences of time, etc.

**Continents.** Give lessons in the order of the book used, on continents, studying such subjects as position, contour, relief, drainage, climate, productions, etc.

**Countries and Divisions.** After such a general view of the continents, give lessons on the various countries, states, etc., studying position, contour, relief, drainage, soil, climate, products, people, political divisions, etc.

**Illustrative Lessons.** In the elementary tasks of the first two years, the pupils are not supposed to "prepare lessons," as in later years. They should, however, be directed to make such observations as may serve the purposes in hand. They may also be invited to gather such objects, plants, etc., as can be secured by them. This holds true especially in "Nature" studies and the "Industries." As a rule it will devolve on the teacher himself to gather the materials for these elementary lessons. (See the Third and Fourth General Principles of Education.) Some of these lessons, as the teacher can judge for himself, ought to be given "out of school hours" and "out of sight of school-houses." The following sample lessons are subjoined as suggestions, and are designed to illustrate the inductive-deductive lesson method to which reference has been made. These illustrations, however, are not meant to be "grooves" for teachers, but only as "sign-posts" to point out the way. The same lesson-method, supplemented, as already indicated, by the study of a simple book, is to be continued the third year.

**A Lesson on Position.** *Teacher* (holding a book). Where is the book, Robert? *Robert*. It is above your head. *T*. Where is it now, Alice? *Alice*. It is under your arm. *T*. Where is it now, Peter? *Peter*. It is in my left hand. *T*. And now? *P*. In Mary's right hand. *T*. Boys, let your left hand hang down. *T*. You may all put your right hand upon your head; under your left hand; over it. *T*. Who sits to your right, James? *James*. Mary Jones. *T*. You may all step forward; backward; to your right; to your left.

**A Lesson on Direction.** *Teacher*. Mary, please stand in

front of the class. Point to the place where the sun rises. Turn your face in that *direction*. The place where the sun rises is called the *East*. Where does the sun rise, Mary? *Mary*. The sun rises in the East. *T*. The class may face the East. *T*. Point to where the sun sets, Mary. That place is called the *West*. Where does the sun set, James? *James*. In the West. *T*. Now, Mary, point to the East with your right hand and to the West with your left hand. If you should now walk forward, you would walk toward the *North*. *T*. John, please point to the North. *T*. If Mary should walk backward, she would walk toward the *South*. *T*. Ellen, please face the South. *T*. The class may rise. Face the East; the West; the North; the South. *T*. At which wall do I point, Jacob? *Jacob*. At the North wall. At the East wall. *T*. Mabel, please walk West, East, North, South. *T*. James, stand against the North wall half way from each end. Ellen, stand against the South wall, etc. Peter, stand against the East wall, etc. Mabel, stand against the West wall, etc. *T*. John, what is the direction from James to Ellen; from Ellen to James; from Peter to James; from Mabel to Peter, etc.

**A Lesson on Map-Making.** *Teacher*. Over what do I move my hand, James? *James*. Over the table. *T*. Please run your finger along the North edge of the table-top. *T*. I will now draw a line on the black-board for the North edge of the table-top. What have I done, James? *T*. Show the class the East edge of the table-top, John. *T*. What does the line that I have just drawn represent, Mary? *Mary*. It represents the East edge. *T*. This line? *P*. The West edge. *T*. This line? *P*. The South edge. *T*. (placing an inkstand on the table-top). Where is the inkstand, Thomas? *Thomas*. It is near the East edge of the table. *T*. How can this be represented on the board, Mabel? *Mabel*. By means of a picture. *T*. Yes, Mabel, or by means of a mark like this



(making a dot or cross). *T.* Miriam, take this foot-rule, and find out how long this desk is. *Miriam.* It is four feet long. *T.* I will draw a line to represent it (drawing a line one foot long). Please measure this line. *Miriam.* It is one foot long. *T.* Please measure the width of this desk, Allen. *Allen.* It is two feet wide. *T.* How long shall I draw a line to represent the width of the desk, Thomas? *Thomas.* I can't tell. *T.* Who can tell? *John.* You drew a line one foot long for the four feet; therefore, I think the line should be half as long for two feet. *T.* That is a good answer. Thomas, please draw the line for me. Now complete the picture, and make marks to show where the pencil and the book are lying. Children, these drawings which we have made are called *maps*. Mollie, what is a map? Tell what you think a map is, James. When you take your seats, try to make a map of your desk-top on your slate. To-morrow you may measure the floor and draw it.

**A Lesson on Land Forms.** *Teacher* (moving the edge of the ruler across the table-top). Is this *surface* even or uneven, Morris? *Morris.* It is even. *T.* (pointing to the folds of a coat). What can you say about this surface, Ruth? *Ruth.* It is not even. *T.* Yes, or *uneven*. *T.* Is the floor even or uneven? *Class.* It is even. *T.* The school-yard? *Martha.* It is not as even as the floor. *Thomas.* I watched the cows in a very uneven field last Summer. *T.* Was the field hilly, Thomas? *Thomas.* Yes, sir. *T.* What do you mean? *Thomas.* Some places in the field were higher than the others. *T.* Such high places, Thomas, are called *hills*. Emma, what is a hill. *Emma.* I think a hill is high land. *T.* What do you think, Peter? *T.* Do you see that high hill over toward the North? *Class.* Yes, sir. *Mary.* I see a very, very high hill way off. It is covered with trees. Papa took us up that high hill last summer to pick berries. There were big stones there too. I think James called them *rocks*. And I saw a

rabbit run! *T.* Well done, Mary. Such very high hills are called *mountains*. *T.* James, what is a mountain? *James.* A mountain is a very high hill. *T.* Yes, or a high elevation of land (moving his hand to show). *T.* When you went down to the creek yesterday, did you find the creek on a hill, John? *John.* No, sir; but I saw a hill to my right and another to my left. *T.* What shall we call a low land between two hills or mountains, Florence? *Florence.* I think mamma calls it a *valley*. *T.* That is the right name. What then is a valley? *Florence.* A valley is the low land between hills or mountains. *T.* Who can describe some valley that you have seen? *Frank.* I think I can, Mr. Porter. *T.* Try it, Frank. *T.* Who can tell what use can be made of valleys? *T.* To-morrow we will make little hills and valleys with sand. Perhaps you will also be ready to make a map of some valley that you have seen.

**A Lesson on Soil.** Having collected specimens of soil, the teacher requires the pupils to handle and observe the specimens. *T.* Please tell us something about this *sand*, Florence? *Florence.* This sand is like sugar; it is not quite as white. These little pieces (the teacher says "grains") have little corners that hurt when they get into your shoe. *T.* Herbert, this earth that I have in my hand is called *clay*. Please tell us something about it. Have you ever tried to make "mud-pies"? *T.* Katie, press this lump of clay into the shape of a ball. Thomas, press this lump into the shape of a little tea-cup. *T.* Why does your mother not plant flowers in sand or clay? *Tillie.* I know; they would not grow. *T.* That is right; sand and clay are not good *soil*, that is, earth, in which to sow seeds, etc. Good soil is called *fertile* soil, and poor soil is called *barren* soil. Nellie, where does your mother plant peas? *Nellie.* She plants them in the garden. *T.* Why? *Nellie.* I think it must be because the garden earth is good—I mean, fertile—soil. *T.* Children, look at this seed. I will

sow some of it in this box and some in this one. Now, please observe every day what will happen, write down whatever you see, and then I will ask you to tell me all that you can learn about these things.

**A Lesson on Plants.** *Teacher.* Please examine these *plants* (handing specimens to the members of the class). Who knows the name of his plant? *Frank.* Mine is a potato plant. *Emma.* Mine is a turnip. *T.* Who knows the name of Mary's plant? (There is no reply.) It is a *parsnip*. I will write the name. How can you tell these plants apart from each other, George? (The answers are to be supplied, and should include form, color, size, weight, etc.) *T.* Where do these plants grow? *T.* For what are they good? *T.* Tell what you know about potatoes, Frank. *T.* Tell what you, etc., know. *T.* How does the farmer take potatoes to market? *T.* How does mother prepare turnips for the table, Jane? *T.* Which do you like better, Morris? Why? *T.* When do farmers plant potatoes? How? Why?

**A Lesson on the Form of the Earth.** *Teacher* (standing with the class on the school grounds). Does the earth as far around as you can see (giving directions) look as flat as a floor? (The answers are to be supplied by the student-teacher.) *T.* Does it look like this (running his finger around the edge of a nickel)? *T.* (holding up a ball or an orange). The earth may seem to you to be somewhat flat and round like this nickel, but it really is round, almost like this ball. If the earth is round like this ball, what can I do if I start here (pointing to some marked spot)? *Minnie.* You can go all around the ball and come back to the place where you started. *T.* That is just what has been done (telling and illustrating fully). *T.* To-morrow we will study some other proofs that the earth is round. You may now go to your seats and write what we have learned about the shape of the earth. I will ask you to read your stories when we recite to-morrow.

**A Lesson on the Seasons.** *Teacher.* In what time of the year do the cherry-trees blossom, Jennie? *Jennie.* In Spring. (This answer is probable.) *T.* When do the farmers make hay, Ralph? *Ralph.* In Summer. (Develop the concepts of Autumn and Winter by similar questions, and elicit descriptions.) *T.* These four times of the year are called *seasons*. How many seasons has a year, class? *Class.* Four seasons. *T.* Name them, Howard. *T.* What is meant by the name season, Sallie? *Sallie.* The different times of the year are called seasons. *T.* How do the four seasons of the year differ from each other, Mabel? *T.* What causes day and night, Howard? (A lesson on day and night is presupposed.) *Howard.* The earth revolves on its axis, and the side toward the sun is day, but the side away from it is called night. *T.* The seasons are caused somewhat in the same way. Let me show you (carrying a globe around the light of a candle, taking care to incline the axis properly, etc.). This is the Summer side (stopping at the right point). Tell me what you see, Mabel. *Mabel.* I see that the light falls right against this spot (pointing it out). It is Pennsylvania. *T.* What, then, is the season in Pennsylvania when the sun shines upon it that way? *Ralph.* It is Summer. (Develop the other seasons in the same way, asking questions to bring out the points. Do not introduce too many difficulties at once. Go slowly.)

Lessons on the other topics indicated in the catalogue of subjects should be given in the same way. It should be remembered that the preceding sample lessons are only suggestions. The individual teacher must ever strive to be himself as much as possible, and to adapt himself to his concrete situations. The lessons on mathematical or astronomical geography should not be taken up too soon, and when taken up they should be carefully planned beforehand by the teacher.

## III. THE INTERMEDIATE COURSE IN GEOGRAPHY.

The topics that deserve attention in this section are as follows : (1) The Ends in View in Intermediate Geography ; (2) The Lesson-Method ; (3) The Subjects ; (4) The Preparation of Lessons ; and (5) The Recitation.

**The Ends in View in Intermediate Geography.** There are four ends in view in intermediate geography lessons : (1) The Enlargement of Concepts ; (2) The Multiplication of Facts ; (3) Inductions ; and (4) Deductions.

*The Enlargement of Concepts.* The cumulative process in the generalizations of the elementary lessons in geography is incomplete for several reasons : (1) The stages of the pupil's development are not equal to the tasks of complex generalization ; and (2) The mass of experiences is insufficient for complete generalization. All the elementary concepts of geography should therefore be developed as fully as possible in the intermediate course. Such a concept as *drainage*, for example, should now be enlarged by comparing a greater number of cases and cases that are complex. (See the First and Third Principles of Instruction.)

*The Multiplication of Facts in Intermediate Geography.* It is evidently impossible for a child to learn many complex facts of geography in three or four years. But, in order to think the greater truths of geography, there are two requisites : (1) The mind must compare a large number of facts ; and (2) The facts to be compared must have matured concepts for subjects and predicates. If, therefore, the pupil is not required to compare many facts, the definitions and principles at which he arrives will be weakly supported, and if he is not required to compare complex facts, the generalizations which he attempts will be inferior conquests. In accordance with this requirement pupils should observe many individuals before they frame a final *definition* of a continent, etc., and to compare complex

individuals before they attempt to think complex *systems* of rivers, winds, currents, etc. (See the Second and Tenth Principles of Instruction.)

*The Inductions of Intermediate Geography.* As suggested in the preceding paragraph, the inductions of intermediate geography should extend to such remote relations as will tend to emancipate the pupil. (See the Eighth Principle of Instruction.) In accordance with this requirement, intermediate pupils learn the principles of continental drainage as well as those of neighborhood drainage, the principles of continental distribution of life as well as those of limited areas, etc.

*The Deductions of Intermediate Geography.* Inasmuch as the first requisite in valid deduction is a legitimate major premise, the deductions of intermediate geography, as in all grades, must begin where induction ends. Within this limitation, however, deduction should follow every induction. Obedience to this requirement will not only be corrective, but the habit will in time emancipate the learner from the common distraction of particulars, and place him in the centre of his geographical survey. This is the supreme end in science. (See the Eighth Principle of Instruction.)

*The Lesson-Method of Intermediate Geography.* Inasmuch as the tasks to be performed are the same, except that they are more complex, the inductive-deductive plan already outlined and illustrated in elementary geography is to be continued in connection with such modifications as the nature of the subjects may demand. (See the Fifth Principle of Instruction.) The text-book, as well as the supplementary work, should be a "balance" of description and explanation. (See the First Principle of Instruction.) More time should be devoted to map-drawing, and the "constructive" method should be combined with the "imitative" method. (See the Sixth and Seventh Principles of Instruction.)

*Intermediate Map-Drawing.* (1) The importance of map-

drawing as a stimulus to close observation is obvious. It follows, (*a*) that geographical knowledge will be more perfect, and (*b*) that memories will be more persistent. (See the Laws of Mental Activity.) (2) The intermediate pupil should be required to represent as truly as possible the real features and proportions of the surfaces to be drawn. Inasmuch as this task necessitates a powerful effort of imagination, there will be two results, (*a*) Interest in geography will be promoted, and (*b*) The phenomena represented will be better understood. (3) Two species of map-drawing are to be recommended. First, the pupil should be required to observe the features to be represented, and then to draw from memory. Second, the pupil should be required to measure the proportions to be represented, and then to draw by "scale." The latter exercise is the proper supplement of the former from the stand-point of culture; it also prepares the pupil to interpret and appreciate maps and globes. All cumbersome systems of "triangulation," etc., are to be avoided for obvious reasons. The pupil that is mature enough for constructive drawing should be required to draw the Mercator projections (see page 286), and then, since they are more accurate, the conic and spherical projections. These projections of parallels and meridians are simpler in the end, and decidedly more reasonable. (4) The subjects of intermediate map-drawing are somewhat as follows: (*a*) The continents, beginning with the simplest one; (*b*) The pupil's county and State; (*c*) The New England group; (*d*) The Middle States group; (*e*) The Southern States group; (*f*) The States in the order in which the book takes them up; (*g*) Other countries. (5) The drawings should, of course, represent at first principally the contour, relief, and drainage, but later on, as fast as the pupil becomes acquainted with the surface which he has represented, he should be required to represent also the distribution of plants, animals, races, manufactures, etc.; the location of cities; the routes of commerce; the climatic belts,

etc. Studied in this way, geography will become very realistic and practical. It is difficult to see how an intelligent teacher can be satisfied with less than this work. In order to succeed in these tasks, the teacher must, of course, study some excellent system of map-drawing.

**The Subjects of Intermediate Geography.** (1) The course in intermediate geography should cover about four years, the period corresponding to the grammar-school life of the pupil. (2) The subjects to be studied are virtually the same as in elementary geography, only that the "individuals" are more complex and the "relations" more remote. The order of the subjects, as well as their full enumeration, is to be sought in the text-book used. Professor Frye's "Intermediate Geography" is possibly one of the best in the market. (3) Stress should be laid on the "interrelation" of physical and political facts. Obedience to this requirement will develop intelligence in geographical study, and thus brighten the pupil's pathway, while at the same time it honors "truth." This interrelation is strongly emphasized in Professor Frye's book.

**Preparation of Lessons.** Whenever it is necessary, the teacher should pave the way for the lessons which he proposes to assign. This he can do by means of illustrations, apparatus, cabinet specimens, photographs, etc., and by referring the pupils to supplementary texts as well as reference books. The pupil should be required to study a lesson assigned in his text-book, to compare it with other texts, to use reference books, dictionary, etc., and to draw.

**The Recitation in Intermediate Geography.** (1) The pupil should not be allowed to bring his book to class, and the teacher should not use a book, except as a supplement in reviews. (2) The recitation should be partly written and partly oral, both in the interest of language and culture. Sometimes it may serve a special purpose to make the recitations wholly



written or wholly oral, or to alternate oral and written recitations. (3) The inductive system of questioning should be used in developing concepts, definitions, and principles. The preparation of the lesson can be tested by combining catechetical questions with the pupil's discussion of topics. (See Frye's "Outline.") The topical method should predominate in reviews. Great enthusiasm can be cultivated in the class by means of occasional talks on geography. This is the great opportunity of the scholarly teacher. Occasionally, too, the regular course should be interrupted by a recitation on current history. Such a lesson, if it be brought into its geographical relations, will reveal to the pupil the physical basis of history. The pupils should be invited to criticise the language, etc., of recitations, and to discuss interesting questions. (4) Drills on relief globes and outline maps should precede and accompany the lessons of the text-book. The ends in view in such drills are (*a*) to present geographical phenomena to the imagination; and (*b*) to pave the way through the imagination for the understanding and memory. In order to accomplish these tasks, the various features must not only be "pointed out," but described and studied. Great pains should be taken to cultivate the pupil's interest in these drills. (5) Recitations thus conducted will be in accordance with the "principles of instruction."

#### IV. THE HIGHER COURSE IN GEOGRAPHY.

The purpose of this treatise limits the treatment of the higher course in geography to the following topics: (1) The Tasks of Higher Geography; (2) The Gradation of the Course; and (3) The Methods of Work.

**The Tasks of Higher Geography.** The tasks of higher geography are as follows: (1) To observe the most complex "individuals" (subjects) and to study the "remotest" relations (connections) in geography; (2) To develop teachers of geography; and (3) To develop geography, *i.e.*, to contribute to

the "science" of geography. The first task is to be attempted in high schools and colleges, and in the interests of scientific culture; the second task belongs to Normal Schools; and the third to the University. (See the First, Second, Third, and Ninth Principles of Instruction.)

**The Gradation of the Higher Geography Course.** There are three stages in the course of higher geography, (1) The High School and College Course; (2) The Normal School Course; and (3) The University Course.

*High School and College Geography.* In the elementary and intermediate courses, the most complex physical individuals (subjects) and the remotest relations were beyond the pupil's power. In the high-school period he becomes mature enough to attempt an ordinary text-book on "physical" geography. In the college period he can take up "comparative" geography. Guyot's "Earth and Man" and Ritter's "Comparative Geography" are appropriate texts.

*Normal School Geography.* The Normal School ought to provide courses in (1) Political Geography, (2) Physical Geography, and (3) The Pedagogics of Geography. The texts of Guyot and Ritter should be supplementary, and Frye's "The Child and Nature" deserves the most careful study.

*University Geography.* The University should provide courses in (1) Comparative Geography, (2) The Correlation of Geography and History, and (3) Original Investigation.

**The Methods of Higher Geography.** (1) The sources of information in higher geography should be multiplied as much as possible. (2) The strictest logic should pervade both preparation and recitation. (3) The "science-method," i.e., the "laboratory" method, must, of course, predominate in the university work in geography.

## V. THE IMPORTANCE OF GEOGRAPHY.

Perhaps no subject in the public school curriculum has greater merits as an educational means. (See the Report of the "Committee of Fifteen.") Four points deserve our present consideration, (1) The Culture Value of Geography ; (2) The Instruction Value of Geography ; (3) The Practical Value of Geography ; and (4) The Training of the Geography Teacher.

**The Culture Value of Geography.** The nature of the subject and the necessary lesson-method call into vigorous service all the functions of the mind. (The student of methods should be required to show the details of this truth.)

**The Instruction Value of Geography.** The facts and truths of geography are not only very interesting in themselves, but, by reason of their bearing on other studies and on the happiness of man, they deserve also to be a part of thorough scholarship.

**The Practical Value of Geography.** The study of geography comes into direct connection with industry, commerce, travel, political transactions, general intelligence, etc. (The student of methods should be required to work out the details of this problem.)

**The Training of the Geography Teacher.** Inasmuch as the possibilities of geography are so great, the teacher's responsibility must be proportionally great. In order to perform his tasks with justice to the subject and with satisfaction to himself, a twofold training is necessary : (1) A training in the "subject" of geography ; and (2) A training in the principles and methods of teaching geography. These two preparations should, of course, go hand in hand as true complements.

## CHAPTER X.

## HISTORY.

INASMUCH as the first requisite in ideal instruction is a definite conception of the branch to be taught, this chapter must be an inquiry into (1) The Nature of History, and (2) Instruction in History.

## A. THE NATURE OF HISTORY.

The nature of history is conveniently considered under the following heads: (1) The "Subject" of History; (2) The Psychology of History; and (3) The History of History.

## I. THE "SUBJECT" OF HISTORY.

In the same sense as plants are the subjects of botany, events are the subjects of history.

"History" vs. "Natural History." In its widest application, history is the study of all events, impersonal as well as personal. The differences between such impersonal events as the life of a plant or an animal, and such personal events as the career of a man or the achievements of a nation, are so great as to justify the division in history commonly denoted by the terms "Natural History" and "History." Only those events in which *persons* are in question, such as the career of individuals, the development of institutions (schools, churches, states, commerce, etc.), the progress of civilization, etc., constitute the subject of history in its strictest sense.

## II. THE PSYCHOLOGY OF HISTORY.

There are two tasks in history: (1) The ascertainment of facts, and (2) Inquiry into the relations of facts. Therefore, the necessary processes in history are (1) Observation, and (2)

**Explanation.** (See the Fifth Principle of Knowledge and the Second Principle of Instruction.)

**Observation.** The facts of history are known (1) By one's own observation, *i.e.*, by direct observation ; and (2) Through the medium of other observers, *i.e.*, by indirect observation.

*Direct Observation.* The witness of an event ascertains facts by means of judgment combined with perception. A general, for example, knows facts by means of his senses. This mode of observation is termed Direct Observation. The reliability of direct observation depends on two factors, (1) The nature of the fact, and (2) The character of the witness. An ordinary observer may correctly ascertain simple facts, but only an expert can ascertain the facts in complex events. A reporter, for example, might correctly observe the transactions of a skirmish, while only the initiated commander could fully observe the features of a campaign. In any case, prejudice vitiates the process of observation.

*Indirect Observation.* Authors of treatises on history are rarely actual witnesses of events. They must ascertain facts through the medium of witnesses or their records. This mode of ascertaining the facts of history is termed Indirect Observation. Indirect observation presupposes (1) The competence of witnesses, and (2) The credibility of documents. The incompetence and prejudice of witnesses and the credulity of authors creep so readily into the records of events, that all history has been called "a lie." This charge is obviously too strong, but it emphasizes the difficulty of the historian's tasks when he must ascertain facts indirectly.

**Explanation.** Inquiry into the relations of events is termed Explanation. The two tasks of explanation are (1) The ascertainment of laws (the invariableness in causes and effects) ; and (2) Prevision in accordance with laws. The necessary processes (see the Fifth Principle of Knowledge and the Tenth Principle of Instruction) are (1) Induction and (2)

Deduction. The former process makes history a science ; the latter reduces it to practical rules of life.

*Induction in History.* Two features of induction in history deserve special attention :

(1) The complexity of the task is very great. Facts must be ascertained before laws can be discovered. (See the Fifth and Sixth Principles of Knowledge.) This preparatory ascertainment of facts is a difficult task (see preceding paragraph) ; but a greater difficulty presents itself in the "second premise" of the inductive argument. In the following syllogism, for example, the second premise is very bold :

The Romans and other people rebelled against oppression ;

These nations represent human nature ;

Therefore all nations will rebel against oppression.

The variety of conditions to which the nations of different lineage, centuries, and places are subject by reason of religious, social, political, physical, and other differences, makes it seemingly impossible to foreknow what a people will do against oppression. That the task is not really impossible is assumed on two grounds, (a) The remarkable uniformity in human nature ; and (b) The cumulative force of examples.

(2) The complexity of the task of ascertaining laws in history, as well as the belief in the possibility of such ascertainment, though its success has thus far been only partial, appear in the fact that there are three distinct theories of history.

(a) The *materialistic* theory, briefly stated, is that events are the direct effects of man's conditions. This theory fails to do justice to God and man as causes of events ; it virtually denies that freedom is an endowment of mind. (b) The *theistic* theory, that events are the direct workings of God, also fails to do justice to the character of God, and ignores man's obvious participation in events. (c) The *spiritualistic* theory, that events are acts of mind, assumes that God permits and participates in events, and that man's conditions are the stimuli in

events. Inasmuch as this theory does justice to God's character, and gives a consistent account of human nature in its relation to circumstances, it is obviously the true explanation of history. On account of the many factors that enter into the problem, the full development of explanatory history (philosophy of history) will require centuries ; but even now this philosophy is fast becoming the realized dream of historians, and, in time, it will be matured into as exact a system as astronomy, geology, and biology.

*Deduction in History.* Two features of deduction in history deserve special attention :

(1) It is possible to reckon out the exact course of any future cannon-ball because we know the forces that enter into its composition, but it is far more difficult to foreknow events in history, because we do not know exactly the moral momentum, gravity, friction, etc., that will enter into human affairs. These differences in the conditions of events are so great as to make prevision difficult even for such experts as political leaders.

(2) To many great thinkers this difficulty in history seems insurmountable. But the supposition that prevision in history is impossible seems too sweeping ; it fails to account for the common conviction that history as experience is "the best teacher." This conviction is the practical argument in favor of history as a branch of study in our schools. Although such prevision is not identical with prophecy, it serves a very practical purpose in the education of a citizen.

**Definition of History.** Observation, induction, and deduction are, accordingly, the essential processes in history. But these processes, together with a systematic statement of results, constitute science. Therefore history is a science. Inasmuch as events are the "subject" of history, it is completely defined as the science of events.

*Species of History.* Various convenient divisions of the task of history are possible. Thus arise the species of history

known as Biography (the history of a person), Fragments of History (the history of an epoch of time), Compendes of History (the history of the great events of a country), General History (the history of nations through all epochs of time), Complete History (the history of all the events of a nation), etc.

### III. THE HISTORY OF HISTORY.

The history of history is a most interesting study. Our inquiry must be limited to two topics, (1) The Stages in the Evolution of History ; and (2) The Present Status of History.

**Stages in the Evolution of History.** Herodotus is known as the "Father of History." In one sense this is not true, for epic poetry, inscription, and legends are forms of descriptive history. It is true, these forms of history are not literally credible, but as efforts they must be classified with descriptive history. Accordingly, *descriptive* history began in the very earliest times. *Explanatory* history began in modern times. German, French, and English historians, such as Raumer, Guizot, and Green, tried to trace effects to their causes, but rarely attempted anything like prevision. It is only lately, and possibly through the stimulus of Guizot's efforts, that explanatory history is becoming *philosophy* and practical guidance.

**The Present Status of History.** Modern school histories for younger pupils are rather descriptive than explanatory, and when, as in the books of Fisher, Myers, Montgomery, Morris, and others, explanations are attempted, they are retrospective rather than prospective views. It is only in universities that history is beginning to be evolved into a philosophy of events, the purpose being to develop historians and philosophical scholarship. It is to be earnestly hoped that our school histories may soon be developed into a practical guidance study, in somewhat the same sense as arithmetic, grammar, and botany are guidance studies.



## B. INSTRUCTION IN HISTORY.

To meet the requirements of ideal instruction, the teacher of history must understand, (1) The Courses of History ; (2) The Tasks of the Courses ; (3) The Methods of Instruction, and (4) The Importance of History.

**The Courses of History.** The logical relation of events is inseparable from their relations in space and time. This *conjunction* imposes upon the student of history the unique necessity of thinking events in space and time in order to understand the course of events—as causes and effects ; it also helps to determine the phases of complexity in the relations of events. The consequent series of subjects and tasks constitutes the courses of history as science. These courses (without going into the argument that reveals them, since the reader is expected to find a parallel argument in the chapter on geography) are as follows : (1) The Elementary Course ; (2) The Intermediate Course ; and (3) The Higher Course.

### I. THE ELEMENTARY COURSE IN HISTORY.

Each course of history has its specific tasks, methods, and subjects. Inasmuch as tasks determine methods and suggest subjects, these topics will be taken up in order.

#### *a.* THE TASKS OF ELEMENTARY HISTORY.

The specific tasks of instruction in elementary history are (1) To construct simple events in the pupil's imagination and memory ; and (2) To cause inquiry into the immediate (obvious) relations of events. The performance of these tasks virtually satisfies the requirements of ideal instruction. (See the chapter on Principles of Instruction.)

**The Construction of Events in the Pupil's Mind.** The pupil must construct the teacher's account of simple events into seeming realities, as adults do when they read the account of Napoleon crossing the Alps. Since this process of imagina-

tion is the pupil's substitute for perception, and the only practical substitute, it is a specific necessity in history. The events thus constructed in imagination must, of course, be impressed upon the memory of the pupil and made permanent possessions of his mind.

**Inquiry into the Relations of Events.** The conception of events and memory are only introductory processes in the study of history. This introduction, however, in combination with simple judgment, furnishes the pupil's mind with the facts of space and time, and thus prepares the pupil to see the connection of events as parts, and as causes and effects. It is only the most obvious (immediate) relations of events that are appropriate subject-matter for beginners in history, but to repress inquiry, or to require pupils to imagine and remember events without stimulating rational inquiry, is to stultify the pupil's reasoning powers. There are many opportunities even in elementary classes for simple induction and deduction, and to miss such opportunities is to fail as a teacher. (See the Sixth and Tenth Principles of Instruction.) When, for example, the pupil has learned the story of Penn's treaty with the Indians at Philadelphia, he should be induced to ask *why* Penn treated the Indians as he did, *how* the Indians kept their word to Penn, whether they *always* (law) kept their promises, what therefore was the best *way* to get along with Indians. In this series of inquiries, simple and natural enough for children, the whole pupil (intellect, feeling, and will) is virtually called into activity. Thus all the requirements of ideal instruction are satisfied.

#### b. THE METHOD OF ELEMENTARY HISTORY.

Suitable means and effective management of means are the two essentials of a good method. We must, accordingly, consider at this point (1) The Means in Elementary History; and (2) The Events of a Recitation in Elementary History.

**The Means in Elementary History.** The possibility of representing space and time concretely by means of pictures, maps, and charts makes these the most suitable, if not (see the Fourth Principle of Knowledge) the indispensable, means in elementary history, where, as we have just seen, one end in view in accordance with the principles of instruction is to represent events concretely to the imagination, thus aiding not only the memory but especially also the understanding of events as contents of space and time. Books adapted to the pupil's capacity, and planned with special reference to the child's love of concrete thought, are the appropriate supplements, and should become regular means the third year of history. (See the first four Principles of Instruction.)

**The Events of a Recitation in Elementary History.** A recitation in elementary history should consist of three events: (1) Reconstruction, (2) Additional Construction, and (3) Explanation.

*Reconstruction.* A recitation in history should begin with review, and the review should begin as far back as time allows or logic requires. Two desirable results can be accomplished by means of such reviews: (1) The pupil's acquisitions become permanent possessions, and (2) The cumulative junction of old and new lessons aids the pupil's understanding and promotes interest. In these reviews the pupil should be required to start at some definite point of time, or with some definite fact, and tell what he knows in a connected way, with as little interruption on the part of the teacher as possible. More than one pupil should be requested to tell the same story in speech or writing; this will stimulate competitive efforts. All the members of the class must be made to understand that they may be called upon to supplement or repeat the recitation of any other member. In the hands of a knowing teacher, such reviews become both stepping-stones and incentives to the "new matter" of a recitation. Inasmuch as these reviews are

corrective, they are indispensable to the constructive process that must follow ; apart from such correction all additions are likely to be blunders in architecture.

*Construction.* The constructive work of a recitation in elementary history consists of instruction, integration, and correction. (1) In the absence of text-books, and in accordance with the requirements of elementary instruction (see Principles of Instruction), the teacher relates additional history to his class, using objects, pictures, relics, charts, maps, etc., to illustrate his narratives, and proceeding in such a way as to require the pupils to interpret what they hear by comparing it with experiences. The procedure should be as perfect a substitute of actual observation as possible. The teacher must be careful to adapt the "new matter" which he relates to the pupil's interest and present powers. He must also be certain of the attention of the whole class. (2) In ideal instruction the pupil's mind is at work as it would be in actual observation. To make sure of this, and to assist the process, the pupil must be required to describe in his own way the new structure in his mind. In other words, this descriptive process is important for three reasons : it requires the pupil's attention to the teacher's instruction ; it renders the facts learned concrete in their integration by constructing them in the imagination ; and it is an excellent discipline in language. (3) To make sure that the structure which the teacher is trying to construct in the pupil's imagination and memory is not defective, and that all the members of the class are building successfully, he must ask "search-light," or "X-ray" questions. It is essential to ideal instruction that the teacher should be a master in this corrective process.

*Explanation.* In order to exhaust the possibilities of the recitation in elementary history, and to improve as well as employ the whole pupil (intellect, feeling, and will), explanation must be added to review and description. (See the

Fourth, Seventh, and Tenth Principles of Instruction.) Explanation, as was pointed out, is an inquiry into relations. The process begins with induction and ends in deduction. In elementary history, only the obvious (immediate) relations are appropriate subject matter.

*Suggestion.* In due time suitable books should be brought into the recitation as supplements to the teacher's narratives and explanations. The teacher may sometimes read what he has already told the class, or partly developed in their minds by means of questions, thus leading the pupils to see the use of books, and stimulating the desire to read. He may also suggest books to be read by the pupils. A suitable text-book should become the basis of the recitations the third year.

**The "Subjects" of Elementary History.** The possibility of interesting pupils, and the working possibilities of the class, determine the choice of subjects in elementary history. (See Principles of Instruction.) Accordingly, elementary history should begin with interesting biography. (1) Inasmuch as local biography is nearest to the child's imagination, it is the best introduction to history in its larger sense. (2) The second half of the first year should be devoted to those persons around whom the great events of American history cluster. Introducing the class to the most appropriate characters of each epoch somewhat in their chronological order and in close association with their geography, the teacher should endeavor especially to develop right concepts and attitudes in pupils.

Having become acquainted with the representative characters of American biography, the pupil is prepared to study collections of persons. Those events that stand out conspicuous in the various epochs of American history, and which must be made the subject of extended study in later years, are practically the most appropriate subjects for the second year in history.

Pupils introduced into history in the way just suggested should be ready to take up such an elementary text-book as Montgomery's the third year. Lessons should be regularly assigned and prepared as supplements to the teacher's instruction, but the requirements should not be difficult. Such a persuasive introduction to a book is of the greatest importance to a right conception of the function of books in general.

## II. THE INTERMEDIATE COURSE IN HISTORY.

The course of history which is appropriate to the average grammar-school pupil is conveniently termed the intermediate course.

### *a.* THE TASKS OF INTERMEDIATE HISTORY.

The characteristic tasks of intermediate history are as follows: the conception of individuals (subjects) of greater complexity; the multiplication of concepts (characters, events); and inquiry into remoter relations of cause and effect.

**Imagination of Complex Subjects.** According to the requirements of ideal instruction, the more complex phases of men (and events) to whom the pupil was introduced in the elementary course are appropriate subjects in the intermediate course. Washington, for example, was known to the elementary pupils as an exemplary son, a heroic youth, etc.; but to the intermediate pupil he becomes an officer in the French and Indian Wars, the commander-in-chief in the Revolutionary War, and finally the President of the United States. These wars, too, were known to the elementary pupils, but only in their simplest phases. The intermediate pupil observes strongholds, armies, marches, battles, retreats, treaties, etc.

**Addition of Subjects.** Men and events to which the elementary pupils were not introduced at all must be introduced in the intermediate course. In other words, intermediate history deals not only with subjects of greater complexity, but

also increases the number of subjects as much as the nature of the case may require.

**Inquiry into Remoter Relations.** It becomes necessary for the intermediate pupil to study not only the causes and effects of isolated events, but also their connection as a course of events. It would, of course, be unreasonable to expect philosophical insight at this stage of history, but pupils ready for the average high school should know at least the "thread" of American history and such principles of American civic life as fit them to be good citizens, even if they should never be able to take a high-school course.

#### *b.* THE METHOD OF INTERMEDIATE HISTORY.

The following topics deserve our attention at this point: (1) The Necessary Means in Intermediate History; (2) The Preparation of Lessons; and (3) The Events of a Recitation.

**The Necessary Means.** Since pupils of the intermediate course in any branch of study should be required to depend more upon themselves than upon the teacher as a source of information, they must be supplied with the necessary substitutes: (1) The pupil of intermediate history needs a systematic catalogue of subjects to be studied. A text-book such as Montgomery's "Common School History" is therefore indispensable. (2) The habit of comparing authorities—a most important habit in education—should begin in the intermediate course of history. The pupil should therefore have access to supplementary text-books. (3) A text-book is only an outline of that which may be known on most subjects. As a stimulus to broader and deeper scholarship, reference books are indispensable. (4) Then, too, it is impossible to understand history apart from its geography. The pupil should therefore have access to suitable maps, charts, etc. Relief

maps of battle-fields, etc., made of *papier-maché* are especially helpful to the pupil.

**The Preparation of Lessons.** Economy and discipline require that in the case of intermediate pupils in history the preparation and recitation of lessons should be distinct events.

*The Teacher's Preparation.* There are at least two reasons why the teacher's mastery of the subject to be taught should be as perfect as possible : (1) Such mastery is likely to enthuse the teacher, so that he works with purpose and energy. (2) The teacher must master a subject with all his powers in order that he may know what mental activities to call into service in his pupils and in what order. Knowing these points, he can form an intelligent plan for the prospective recitation, choose the best means, and prepare himself to use these means most effectively. Thus it follows that the teacher of history must study the pupil's text-book in connection with other text-books, maps, pictures, dictionaries, encyclopædias, etc., think every lesson into its connection with preceding and following lessons, and plan the recitation to meet all the requirements.

*The Pupil's Preparation.* A definite lesson having been assigned, and helpful directions given, the pupil should be required to study his text in connection with other texts, maps, encyclopædias, and the dictionary. The teacher must insist on important dates, names, places, etc. Every pupil should be made to feel that every lesson ought to improve his vocabulary and sentences, but no pupil should be allowed to commit the text. The habit of thinking the lesson in one's own language, arranging the thoughts of the lesson into a system, and bringing it into connection with past lessons, should be developed in all pupils. Progressive maps and outlines may be required as part of the preparation of pupils in intermediate history.

**The Recitation in Intermediate History.** The items to be considered in this connection are as follows : (1) Written Work ; (2) Oral Work ; (3) The Examination of the Writ-



ten Work ; (4) The Assignment of Lessons ; and (5) Review Recitations.

*Written Work.* (1) The following are obvious merits of written work in recitations : it is a stimulus to thorough preparation of lessons ; it is a better test of the pupil's preparation and capacity ; it enables the teacher to employ more pupils simultaneously ; it is the teacher's best opportunity to present the " thread " of history in the questions which he prepares for those pupils who are to write out the recitation ; it is a fine opportunity for the pupil to tell in a connected way what he knows and thinks ; and it is an excellent supplement to the regular work in composition. (2) The black-board is the most suitable means for written work in recitations. The places at the board should be numbered. Numbered questions—a logical series of questions, the series beginning in reviews and bringing these into connection with the advance lesson, the whole arrangement so planned as to cover the ground in outline—carefully prepared by the teacher should be placed below the corresponding numbers over the black-board as soon as the class is ready for work. As soon as these questions have been assigned to the class " by numbers," the persons to whom the numbers were assigned should be requested to pass to the board, write their name at the top, copy the question, analyze it into topics, and proceed to write out the necessary paragraphs. (3) The teacher should spare no efforts to develop in his pupils right habits and tastes in spelling, punctuation, capitalization, diction, sentence qualities, plan of paragraphs, penmanship, etc. No book should be allowed in the recitation. Both pupils and teachers should cultivate self-reliance.

*Oral Work.* While part of the class is reciting at the board, the teacher puts questions to the other members of the class, requires oral answers, conducts drills, offers suggestions, etc. A skilful teacher can make this oral work a stimulus to preparation of lessons, a discipline in thinking, a valuable means

of instruction, and an excellent opportunity in the development of the pupil's power to speak.

*The Examination of the Work on the Board.* When about half the time allotted to the recitation has expired, and all the writers have returned from the board, the examination of the board should begin. The writers should read in the order of the numbers on the board. The reading of both questions and answers should be distinct, forcible, and elegant. The whole class should be required to hold themselves in readiness to criticise, but always in strict subordination to the teacher's supervision. The teacher should supplement, correct, and instruct whenever time allows and wherever it is proper. In the performance of this task skill in drawing will be very helpful, and superior scholarship will be an inspiration to the class.

*The Assignment of Lessons.* In advanced classes and in cases where the teacher can estimate the probabilities, the next lesson may be assigned before the regular work of a recitation begins. Commonly, however, it is best to assign the next lesson at the close of a recitation. The teacher's assignments should be very definite. The pupil should be directed to the various sources of information, and helpful suggestions should be added.

*A Review Recitation.* In addition to the reviews with which all recitations should begin, there should be special reviews as often as time permits and necessity dictates. In these review recitations the questions on the board should be a progressive series, *i.e.*, events should be considered in their chronological order. The oral questions may be put in reverse order for variety and discipline. This regressive order is rather difficult for younger pupils.

**The "Subjects" of Intermediate History.** (1) An ordinary text-book on history is the best practical catalogue of subjects in intermediate history. (2) In order to be a suitable

text-book, it should be adapted in subject-matter, plan, and language to the stages of the pupil's development. The subject-matter should not be too abstract and general. The plan of a book for intermediate pupils should be rather ethnographic than synchronistic; it should be logical, but not too complex. The vocabulary for a class in intermediate history should be unpretentious, precise, and not too copious, while the structure of sentences and paragraphs should be simple, concise, and elegant.

### III. THE HIGHER COURSE IN HISTORY.

The study of history in the high school, normal school, college, and university deserves for several reasons to be termed the *higher* course in history : (1) The ends in view are higher ; and (2) The scientific method, though employed in miniature in the elementary course, and with considerable strictness in the intermediate course, is pressed to its utmost limits in the higher institutions of learning.

**The Tasks of Higher History.** There are several distinct ends in view in higher history : (1) To train the student so thoroughly in the subject-matter and method of history that he will realize its intrinsic merits, and therefore love and study it after school days have ended. (2) To equip the general student and the great professions with such knowledge of history as is needed in their various pursuits. (3) To pursue the study of history as science and philosophy, and to contribute as much as possible to the development of the science and philosophy of history.

**The Distribution of "Subjects" in Higher History.** Inasmuch as the method of study and recitation in higher history, though somewhat modified to suit maturer minds, is virtually the same as before, no additional description is necessary at this point. It seems necessary, however, as a matter of instruction for young men and women, to map out a suit-

able course in higher history. The following outline is respectfully submitted :

*High-School History.* (1) Our high schools should offer a course in general history, as much as may be found in Myers ; and, if time allows, a special course in Greek, Roman, and English history should be added. (2) A course in civil government also belongs to the high-school course in history. Every high-school graduate should know enough about the Constitution of his own State and that of the United States to enable him to be a good citizen, and, if need be, a good officer.

*Normal-School History.* (1) Normal schools should offer a very thorough course in the history of the United States, general history, and civil government. (2) The pedagogics of history must, of course, be added.

*College History.* It devolves on colleges to offer courses in general history, special courses in the history of the great nations, courses in the various departments of civics, and a course in the philosophy of history.

*University History.* It belongs to the university (1) to offer an extended course in the philosophy of history ; and (2) to develop the science and philosophy of history by original contributions. The method of the university must, of course, be scientific in the fullest sense, and implies original investigations.

#### IV. THE IMPORTANCE OF HISTORY.

It must be admitted that such a catalogue of events, dates, and names as frequently passes for history is perhaps interesting enough as reading-matter, but of no special value in the education of a man or woman. The fact that history has too commonly consisted of such enumerations, and that these are so often simply committed to memory, is deplorable enough. But history is more than "a record of events" ; it is a science, and as such must be a valuable instrument in education. The

opinions of Compayre, Fitch, and the "Committee of Fifteen" on this subject are particularly interesting.

**The Culture-Value of History.** Inasmuch as history is a science, the necessary method of study calls into service the whole pupil (intellect, feeling, and will). The study of history, as we know from a consideration of its method, is a most excellent means in the training of the imagination, memory, judgment, reasoning, conscience, patriotism, etc.

**The Instruction-Value of History.** As the science of events, history is a school-master of citizens and moral agents. (1) History is the citizen's school-master because it teaches him the laws of national life just as effectively as physiology teaches the laws of physical life. (2) A knowledge of causes and effects in the moral career of historical characters is moral philosophy in the concrete.

**A Source of Satisfaction.** To thinking men and women the science of events must be a source of great satisfaction. Just as people who have never viewed the world of nature from its mountain-tops rejoice with exceeding great joy on finally beholding the glories and wonders of earth, so do those who behold the world "as it was and is and shall be" rejoice in the gratification of their philosophic senses.

**The Training of Teachers of History.** Since the study of history can be made such a valuable instrument in education, it must be obvious that the responsibility of teachers of history is very great. This conclusion obtains added force from the fact that history has so commonly been taught simply as "a record of events" and by the "rote" method. It follows, therefore, that teachers of history need a thorough training (1) in history itself, and (2) in the pedagogics of history.

## CHAPTER XI.

## DRAWING.

THE true object of instruction is to cause right mental processes in pupils. (See the Principles of Instruction.) It is obvious that, in order to cause right mental processes in teaching any branch of study, the teacher should *know* those processes. Therefore, the pedagogics of drawing is concerned with two general topics: (1) The Nature of Drawing; and (2) Instruction in Drawing.

## A. THE NATURE OF DRAWING.

The nature of drawing is most conveniently studied under the following heads: (1) The Subject of Study; (2) The Psychology of Drawing; (3) The Definition of Drawing; and (4) The History of Drawing.

## I. THE SUBJECT OF STUDY.

In the sense in which arithmetic is the study of numbers, drawing is the study of linear representation of forms.

**Linear Representation of Forms.** It is possible to simulate the real outline of objects so perfectly on a flat surface that on seeing the representation we recognize the intended semblance. This linear representation of objects is termed *Drawing*. Three things in the process of drawing require special attention: (1) The Length of Lines; (2) The Direction of Lines; and (3) Marks of Expression.

*The Length of Lines.* There are two modes of determining the length of lines in drawing: (1) The length-facts of an object may be observed and represented without the aid of measuring instruments. (2) The length-facts of an object may

be observed and represented by means of measuring instruments, such as the foot-rule, compass, etc.

*The Direction of Lines.* (1) The lines of a drawing that represents a plane surface to the eye directly in front of its centre have the same direction as the lines of the surface represented in the drawing. (2) As the distance from the eye increases, the surface of an object seems to grow smaller. (See Natural Philosophy.) For the same reason receding surfaces seem smaller. This *appearance* of objects is represented in drawings by convergent receding and shortened vertical lines. The position directly opposite the eye is indicated by a point on the paper, and all receding lines representative of the edges of objects are drawn *to* that point. Vertical lines, of course, remain vertical in the drawing; but, since the paper is supposed to lie in a vertical plane, the vertical lines become shorter as the distance from the point of vision increases, the length being determined by the convergent lines. (3) There are two modes of representing the direction, as well as the lines: (1) "By eye," and (2) By means of instruments.

*Marks of Expression.* (1) Light is the indispensable condition of sight. It is on the sunny side of objects that the surfaces are illuminated; the opposite surfaces are darker, and shadows extend from them in the direction opposite from the light, the boundaries of which are determined by the lines that extend from the edges of the light past the object. (2) In drawing, some point from which the light is supposed to come must be assumed. The phenomena of light just described must be represented by corresponding light, darkness, and shadows. The marks that represent these phenomena are termed *Marks of Expression*. Among the derivative phenomena that may be thus represented are rotundity, opacity, transparency, the grain of wood, the mechanical plan of surfaces, relative tones of coloring, etc.

## II. THE PSYCHOLOGY OF DRAWING.

The ideal method of studying linear representation of forms, as well as numbers or plants, or any other subject, consists of observation, induction, and deduction. (See the chapter on the Nature of Knowledge.)

**Observation in Drawing.** The first step in the formal study of drawing is observation, *i.e.*, the ascertainment of facts. Two species of facts must be ascertained in drawing: (1) The Form-Facts of Objects, and (2) The Representation-Facts of Form.

*The Form-Facts of Objects.* The first thing to do in order to draw an object is to become acquainted with its outline, *i.e.*, with its bounding lines, their direction, length, proportions, etc. If, for example, the student should wish to draw a *hat*, he must first ascertain the direction of the rim-lines, the breadth of the rim, the height and shape of the crown, the width of the band, etc.

*The Representation-Facts of Form.* It is not enough in drawing to know the form-facts of an object; the representation-facts must also be ascertained. In other words, the observer must find out what lines will represent the object in question to the imagination. In the case of a *hat*, for example, the observer will find that a very small number of lines virtually represent the hat completely.

**Induction in Drawing.** Two species of laws must be ascertained in drawing: (1) The Form-Laws of Objects, and (2) The Laws of Form-Representation.

*The Form-Laws of Objects.* It is found by comparison of the form-facts of objects that all objects are analyzable into the various elementary phases of the sphere, the cube, the cylinder, the cone, the pyramid, etc. These form-laws of objects must be developed in pupils just as any other law is developed, *i.e.*, by hypothesis and proof. The development of the con-



cepts of the elementary forms, together with the terms and definitions that belong to their description, is the indispensable task of pupils who would be masters in drawing. It is only when these concepts have become standards of comparison that objects can be readily classified and represented.

*The Laws of Form-Representation.* It is found by comparison of facts that the *length*, *direction*, and *repetition* of lines which represent objects to the imagination are subject to law, just as the forms of objects are subject to law. (See Natural Philosophy.) (1) The relative lengths to be represented can be perfectly represented by means of a "scale of proportions." (2) The appearance of objects of three dimensions is a perspective phenomenon subject to the laws of light, and therefore capable of mathematically correct representation, the main features of the problem being the point of vision, the level of the eye, and the position of the object. (3) The amount of light, or its absence, can be represented by such repetition of lines as will simulate the phenomena in question.

The discovery of the laws of linear form-representation has made a science of drawing possible, and the study of these laws is as indispensable to great success in drawing as the study of the laws of numbers is to great success in arithmetic. It is only when these laws have become familiar that the countless diversities of object-forms can be satisfactorily represented.

**Deduction in Drawing.** There are two deductive tasks in drawing: (1) The analysis of objects into type-forms, and (2) The linear representation of objects.

*Type-Form Analysis of Objects.* The first thing to do in systematic drawing is to discover the elementary form or forms to which the object or imagination to be represented belongs. If, for example, the student wishes to draw a *goblet*, it is of the greatest advantage to him to see in the goblet-form the elementary square and circle. Apart from

such analysis every task in drawing is an isolated, unclassified experiment.

*Linear Representation of Objects.* There are two possible modes of linear representation : (1) The learner may observe and imitate the representation of an object. This mode of drawing does not presuppose the analysis of the objects to be drawn into the type-forms to which they belong. The task requires perception, memory, imagination, and direct comparison, and is, therefore, the right thing for beginners. (See the First Principle of Instruction.) (2) The learner may observe the object to be drawn, analyze it into its type-forms, and draw it by rational representation. This task requires a knowledge of "scales of proportion," "perspective," and "mathematics," and is therefore possible only for maturer pupils. (See the Sixth Principle of Instruction.)

**The Definition of Drawing.** The method of study just described, together with a systematic statement of results, constitutes science. A science of drawing is therefore possible, its subject being *linear representation of forms*. But drawing, as a physical realization of science, is also an art. Indeed, this is the phase of drawing commonly in mind when the subject is mentioned. Briefly summed up, drawing is the science and art of linear representation of forms. The following classifications are convenient : (1) The linear representation of forms without the aid of measuring instruments is termed *Free-Hand Drawing*. (2) Representation by means of instruments is termed *Mechanical Drawing*. Both free-hand and mechanical drawing become *perspective drawing* when distance, direction, and light are taken into account. The special feature of perspective drawing is the process known as "foreshortening," *i.e.*, the representation of two or three dimensions by means of shorter and fewer lines as determined by "point of vision." The terms descriptive, artistic, industrial, architectural, etc., name the purposes for which a drawing may be

made. Crayoning and engraving are also regarded as species of drawing.

**The History of Drawing.** The most ancient people had some knowledge of drawing. The Oriental nations, especially the Egyptians and the Babylonians, had a systematic knowledge of the subject. Greece and Rome developed drawing first into a fine and then into a useful art. Drawing was the handmaid of geometry, one of the famous "seven liberal arts" of the Middle Ages. The educational reformers, especially Comenius, Pestalozzi, Froebel, laid great stress on drawing. In modern education drawing has become an absolute necessity.

In primitive times drawing served as a substitute for speech. The Egyptians were probably the first to produce a system of "picture" writings. In Greece the æsthetic impulse became the great stimulus to drawing. It has ever since continued to be the handmaid of the fine arts. Drawing first became an educational means in Egypt and Greece. Æsthetic, moral, and practical interests have made drawing an imperative means in modern education. In connection with manual training, and as a part of it, drawing will acquire still greater importance.

## B. INSTRUCTION IN DRAWING.

The nature of drawing makes inquiry into the following subjects a necessity for teachers of drawing: (1) The Courses of Instruction in Drawing; (2) The Subjects of Study in the Courses; (3) The Methods of Instruction; and (4) The Importance of Drawing.

### I. THE COURSES OF INSTRUCTION IN DRAWING.

The number of necessary adaptations of the subject and method of drawing to the powers and needs of the pupils determines the number and character of the courses of instruc-

tion. (See the Principles of Instruction.) The following topics, therefore, deserve attention : (1) The Nature of the Subject ; (2) Possibilities of the Pupil ; and (3) The Number of Courses.

**The Nature of the Subject.** (1) Drawing "from pictures" requires observation and imitation. The mental functions thus brought into service are perception, memory, imagination, direct comparison, interest, and attention. (2) Drawing "from objects" requires the analysis of the object to be drawn into type-forms and rational representation. The mental functions thus brought into service are perception, direct comparison (implying memory, abstraction, and imagination), deductive reasoning (implying previous inductions and a training in mathematics), and attention (implying interest). (3) Drawing "from problems," as in invention, requires rational comprehension of the conditions and rational representation. The task presupposes a knowledge of the elementary forms, simple and composite, and a training in mathematics.

**The Possibilities of the Pupil.** (1) The power to imitate (see Courses of Penmanship) is a characteristic power of childhood. (2) The rational representation of objects of observation, presupposing skill in imitation as well as considerable maturity in syllogistic thinking, is seldom possible before the latter part of the grammar-school epoch. (3) The rational representation of imaginations and problems requires a maturity in abstraction and mathematics which is seldom to be found before the high-school epoch.

**The Number of Courses in Drawing.** In view of the psychology of drawing and the powers of pupils, it seems appropriate to arrange three courses of instruction in drawing : (1) The elementary, or imitative course, (2) The intermediate, or rational course ; and (3) The higher, or special course.

## II. ELEMENTARY DRAWING.

The following topics deserve our attention at this point: (1) The Subjects of Elementary Drawing, and (2) The Method of Instruction.

**The Subjects of Elementary Drawing.** The passage from subject to subject in drawing should be from the simple to the complex, and from that which is known to that which is in logical relation with it. (See First and Second Principles of Instruction.) Taking these requirements and the possibilities of the pupil into consideration, it is believed that the following ground can be covered in about six years:

(1) The sphere and its obvious resemblances in objects.

(2) One face of the cube and its obvious resemblances. This step includes the square and the rectangle, together with such descriptive terms as straight line, right angle, etc.

(3) Two faces of the cube from various points of vision and obvious resemblances. The worker begins with a front view, and, after choosing a centre of vision, completes the top face by first drawing receding lines and then choosing a rear line for the top face. Lessons on the right and left faces of the cube in connection with the front face should be added. The faces may be represented as open and containing interesting objects. No attempt should be made at this time to explain the centre of vision and receding lines. The appeal in these lessons is principally to the child's great imitative power.

(4) Three or more faces of the cube from various right and left positions, above and below the level of the eye, together with obvious resemblances. In the course of these lessons the pupil should be taught to recognize and name the three species of receding lines, parallel lines, and surfaces. Special lessons on the centre of vision and the horizon line will be necessary.

(5) Easy composition of sphere and cube forms, together with obvious resemblances and applications.

(6) The vertical cylinder in the various right and left positions, above and below the level of the eye, together with obvious resemblances and applications. In connection with these lessons the child should learn to distinguish plane from curved and round surfaces.

(7) The horizontal cylinder in the various positions, together with obvious resemblances and applications.

(8) The receding cylinder in various positions, together with obvious resemblances and applications.

(9) Easy composition of sphere, cube, and cylinder forms, including obvious resemblances and applications. Easy problems may be added.

(10) Lessons on the hemisphere, cone, prism, etc., may be introduced at this time.

(11) Easy invention *by line*, including dictation, substitution, and designing, should be gradually introduced, but not before the fifth or sixth year.

**The Method of Instruction in Elementary Drawing.** Two points deserve our present attention: (1) The Preparation for Lessons in Elementary Drawing, and (2) The Recitation.

*Preparation for Lessons in Elementary Drawing.* (1) The teacher of drawing should see to it that there is a supply of necessary materials at hand. A black-board and its belongings, paper and its belongings, and a collection of elementary forms are among the important materials in elementary drawing. A large assortment of larger and smaller objects that obviously resemble the elementary forms is a most valuable equipment in elementary drawing. (2) The teacher should practise *placing* and *drawing* the objects that are to be used in the lessons. He should study how to introduce devices calculated to interest children long enough in a given form to teach it thoroughly. He should plan the steps which he must take, the questions, hints, etc., and try to be prepared for all emergencies.

*The Recitation in Elementary Drawing.* The ideal method

of *study*, as already pointed out, consists of observation, induction, and deduction in the order just submitted. The ideal method of *instruction* (see Principles of Instruction) should, therefore, *cause* these processes in pupils.

(1) The attention of the pupil must be directed to the form-facts of the object in question and to the teacher's representation of these facts. The teacher must ask such questions and give such hints, etc., as may stimulate and help the observing pupil. In many instances this may need to be many times repeated before the pupil can draw "from the picture," *i.e.*, imitate the teacher's representation. It is at the pupil's successful imitation of his picture, however awkward such imitation may be at first, that the teacher of elementary drawing must aim. (See the First Principle of Instruction.)

(2) It is not enough that the elementary pupil can draw the elementary forms in question ; he should be taught to look for obvious resemblances and possible applications until by and by that elementary form shall have become a general concept that serves him in his practical classification of objects. The teacher must, therefore, *show* the pupil how to convert the form in question into familiar object-forms. The happy surprise which this revelation will produce in pupils will stimulate them to look for similar resemblances in the objects with which they meet. These conversions of an elementary form into familiar object-forms, and the teacher's representation of object-forms that obviously resemble the elementary form in question, should be imitated just as the elementary form itself was imitated. When the pupil can do this a great deal has been accomplished. (See the Fourth and Eighth Principles of Instruction.)

(3) When the pupil has learned to recognize the elementary form in question, and to draw it from the picture, and to *imitate* the teacher's conversions of the form into familiar object-forms, as well as his representation of object-forms that

obviously resemble the elementary form, he should be taught to draw, without the teacher's previous representation, such objects as obviously embody the form in question. This is termed "drawing from the object," and is a long step in advance; the pupil has now learned to draw deductively, which is the end aimed at in ideal instruction. (See the Eighth and Tenth Principles of Instruction.)

(4) In due time the pupil should be taught to "draw from problems." This task of *invention* implies familiarity with the lines, surfaces, and possible positions of the elementary forms, together with their technical description, and should therefore not be attempted too soon. When the right time for this work has come, the teacher may send his class to the board and *dictate by line* the things to be done. There are three possible ways of line-dictation: (a) The teacher may dictate the direction, length, and character of the lines, and expect the pupils to produce them, thus inventing a picture; (b) He may propose a form and dictate substitutions of lines, as a curve for a straight line. This is called invention by line *substitution*; and (c) He may propose a form and dictate substitutions of lines that differ not only in *kind* but also in *length*. This form of invention is called *designing* by line.

(5) Elementary pupils soon grow tired of one form. In order to keep up the necessary interest in the form in question the teacher must resort to various devices, such as placing eggs, balls, birds, etc., upon, near, or into open forms. Suitable stories addressed to memory or imagination are very effective devices. Teachers should, however, be careful not to make such devices too prominent.

(6) It is believed that elementary pupils need no text-books in drawing before the fifth or sixth year; and even then it is possible to get along without them.

**Illustrative Lessons.** The following lessons are subjoined as illustrations of the method just described. They are de-



signed to illustrate the *spirit* of the method rather than the historical details, which must be left to the individual teacher under his particular circumstances.

**The Sphere.** *Teacher.* What do I hold in my hand, Grace? *G.* A ball. *T.* The shape of a ball is called *Sphere*. Have you ever seen pictures of a sphere, Harry? *H.* Yes, sir. *T.* I think I know what you would like to do. *H.* I would like to make pictures myself. *T.* Very well; you will be able to do so by and by. Now look at the ball in my hand and fix its shape in your memory. (Turning to the board and looking at the ball) Watch me, children; I will show you how to make a picture of this ball. (The teacher draws a circle and adds a few marks of expression.) What did I do, Mary? *M.* You drew a ring and put little lines in it; you made a picture of the ball in your hand. *T.* You may draw the same picture, Jane. (Jane steps to the board or turns to her paper and "draws from the picture," but looks at the ball to see if her picture resembles the ball.) *T.* Jane, this is the right way to hold your pencil or crayon (showing her). (Awkward positions of the body and improper ways of holding the pencil or crayon should be corrected, but individuality should not be crushed.) *T.* What have I done, Jacob? *J.* You have changed the picture into a tennis-ball picture by making a seam on it. *T.* The class may please try to do what I did. (They do so with a will.) *T.* Think of some object that looks like a ball. (The class name apples, oranges, onions, etc.) *T.* Watch me, please. (Looking at an apple, the teacher draws it with the stem on top.) *Minnie.* You looked at the apple in your hand and then made a picture of it. I saw how you fixed the stem. *T.* That is the right way to watch, Minnie. I will draw a number of apple-pictures, and you may copy them at your seats. I will look at your work by and by, to see how well you can draw. (Drawing "from the object" should be gradually associated with drawing from pictures.)

**Two Cube-Faces.** *Teacher.* What do I hold in my hand, Ralph? *R.* A box. *T.* How many faces of the box can you see if I hold it as I do? *R.* Two; the one toward me, and the top face. *T.* Which face do you think I should draw first, Albert? *A.* I think I would draw the one toward me first. (The teacher heeds the suggestion and draws the front face.) *T.* What shall I do now? *A.* I do not know. *T.* Who can help me? (No one sees the right thing to do.) Please watch me. (The teacher fixes the centre of vision, draws the necessary receding lines, and, choosing the distance backward, completes the top face.) What have I done, Helen? *H.* You made a dot, drew lines from the top corners of the square to that point, and then drew another line parallel to the top line of the square, thus completing the top face. (Lessons on the square, rectangle, parallel lines, receding lines, and angles are presupposed in this lesson.) *T.* That is just what I have done. (Teachers must not expect perfect answers in these lessons.) The whole class may please do on your papers what I did on the board. You may also try to draw two faces of objects that you can see or remember.

**The Vertical Cylinder.** *T.* What do I hold in my hand, Maude? *M.* A tomato can. (The children laugh.) *T.* The shape of this can is called *Cylinder*. (The teacher writes the word and requires the children to copy it.) *T.* How much of the cylinder can you see from your seat if I hold it this way, Harold? *H.* I can see half way round the can and the whole top. *T.* What is the shape of the top face? *H.* It is a circle. *T.* Can you see the bottom, Rufus? *R.* I can see only half way round the bottom. *T.* What is the shape of the bottom? *R.* It is round like the top. *T.* What is the shape from top to bottom, Grace? *G.* It is straight. *T.* Please watch me. What did I do, Robert? *R.* You drew a circle for the top of the box, parallel lines for the sides, and a semicircle for the rim of the bottom. *T.* What changes have I made, An-

nie? A. You put apples into the box and drew the picture. T. The class may draw the box with apples in it. (This may be done at the seats or at the board.) T. If your eye were somewhere in the line which I have just drawn, how much of the box could you see when I hold it this way? (The nine possible positions should be studied and drawn, the teacher drawing first and the children imitating. Various devices should be introduced to keep up interest. In subsequent lessons the teacher should convert the cylinder into band-boxes, stove-pipes, caps, hats, barrels, etc., and thus lead the pupils to analyze familiar objects into type-forms. The children should also be encouraged to bring such objects as seem to embody the type-forms in question. Some of these should be drawn "from pictures"; others "from the object."

*Dictation by Line.* (The black-board is preferable to tablets in class dictations. The pupils should be expected to measure "by eye" and to draw "free-hand." The following dictations are quoted from Professor Augsburg's excellent manual, "Elementary Drawing Simplified," which should be the companion of every elementary teacher.

"(1) Draw a light vertical line 16'' \* long. This is called the *median line*. (2) Through the upper extremity of the median line draw a horizontal line projecting 2'' on each side. (3) 4'' below this horizontal line draw another horizontal line like it. (4) 3'' below the last horizontal line draw a horizontal line projecting 4'' on each side of the median line. (5) Through the lower extremity of the median line draw a horizontal line like the last one. (6) Connect the extremities of the first and second horizontal lines by vertical lines. (7) Connect the extremities of the second and third horizontal lines with oblique lines. (8) Connect the extremities of the third and last horizontal lines with vertical lines."

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\* One indice stands for feet, and two indices for inches.

## III. INTERMEDIATE DRAWING.

The important features of intermediate drawing present themselves under the following heads: (1) The Subjects of Intermediate Drawing, and (2) The Method of Instruction.

**The Subjects of Intermediate Drawing.** The following subjects of study belong to the intermediate, or rational, course of drawing. Two thirty-minute lessons a week for about four years should probably be devoted to this course:

(1) Derivative forms obtained by division of the sphere, cube, cylinder, etc. In other words, the *thread* of the course should be the same as that of the elementary course, but such figures as can be obtained by one, two, or more divisions of the first forms must be studied instead of the elementary wholes. From the sphere, for example, we may thus derive the hemisphere, the quarter-sphere, etc. From the cube may be derived plinths, triangular prisms, oblong blocks, etc. (The methods-student should be required to make and name the various divisions.)

(2) Conversions into less obvious forms, together with recognition of the type-forms in the objects which pupils meet.

(3) Compositions of the derivative figures, the number of forms to be represented being determined by the number that may have been studied.

(4) Invention by line and form.

(5) The elements of map-drawing in connection with geography and history, and working drawings in connection with modelling and the elements of manual training.

**The Method of Instruction in Intermediate Drawing.**

(1) It is probably not advisable to dispense altogether with drawing "from the picture" in the intermediate course (see the first three Principles of Instruction), but drawing "from the object" and "problem" must become the rule.

(2) In addition to such drawings as the teacher may see fit

to use as "preparations," he must strive to supervise the minds of his pupils in such a way as to preserve the ideal method described in elementary drawing.

(3) Inasmuch as objects to be drawn in this course should first be analyzed into type-forms, the teacher must study how to *place* objects in the best positions. In order to keep up proper interest in such tasks, there should be an interesting collection of materials on hand for class use, and the teacher should frequently draw interesting pictures as a stimulus to the pupil's ambition.

(4) Suitable text-books, such as those of Professor Augsburg, the Prang system, etc., should be used as supplements in intermediate drawing.

*Remark.* The methods-students should be required to write out illustrative lessons for intermediate work.

#### IV. HIGHER DRAWING.

The important features of the higher, or special, course of drawing present themselves, as in the case of intermediate drawing, under two heads: (1) The Subjects of Higher Drawing, and (2) The Method of Instruction.

**The Subjects of Higher Drawing.** The following subjects belong to the higher course of drawing. The course requires complex reasonings and is designed to fit students for special vocations. The tasks of this course must for various reasons be divided between high schools, normal schools, and technical schools:

(1) Derivative forms obtained by composition of various forms. In other words, the logical thread of the other courses is to be preserved, but while the thread is a series of concentrations on each of the elementary forms in order, the other elementary forms and derivatives should be correlated with the leading one.

(2) The type-groups should be converted into the object-

forms of nature, history, and imagination, and objects of nature, history, and imagination should be interpreted into the type-forms of which they may be embodiments.

(3) Landscapes, historic groups, fictions, etc.

(4) Invention by line, form, and idea. This is the sphere of industrial, architectural, and high-art drawing.

(5) The various species of map-drawing should be made the subject of special study on the part of teachers, geographers, surveyors, etc.

(6) Teachers should understand the pedagogics of drawing.

**The Method of Instruction in Higher Drawing.** The method of higher drawing is virtually the same as that of intermediate drawing. The higher phases of the subject, the special purposes in view, and the individuality of the teacher must, of course, determine the necessary adjustments. The pedagogics of drawing is a problem of psychology and economy, and must obviously be studied from those stand-points. Suitable text-books are the necessary supplements.

## V. THE IMPORTANCE OF DRAWING.

To appreciate the importance of drawing, one must understand its efficiency as a means of culture and instruction. The following topics deserve special consideration: (1) The Culture-Value of Drawing; (2) The Instruction-Value of Drawing; (3) The Practical Value of Drawing; and (4) The Training of Teachers of Drawing.

**The Culture-Value of Drawing.** Properly taught, drawing is the possible means of exercising the whole pupil (intellect, feeling, and will). (The methods-student should be required to prove this statement.) The efficiency of drawing as a means in the culture of the eye, the taste, and the hand has long been known. (1) Drawing requires accurate and complete observation, and therefore improves the eye. (2) It requires the most accurate comparisons of distances, proportions,

directions, etc., and thus improves judgment. And inasmuch as perfect rather than imperfect objects are usually selected for study, drawing develops æsthetic judgment, or taste. This tendency is augmented by the connection into which drawing is brought with painting, etc. (3) Drawing employs the hand in connection with the eye to express judgments, and thus not only promotes a most important correlation, but also properly subordinates the hand and eye thus brought into correlation to the will. This correlation of the hand and eye, and their subordination to the will, is one of the most important ends in view in education. (See the chapter on the Nature of Education.)

**The Instruction Value of Drawing.** It is especially through the study of "form" as required in drawing that the mind discovers the *expressive* power of forms, and thus virtually acquires a key to the interpretation of many thoughts, emotions, and volitions, as embodied in Nature and Art. The interpretations of Nature and Art which thus become possible greatly increase, as appears from statistics, the *appreciation* of Nature and Art, and thus add materially to human happiness. This result is one of the right ideals in education. (See the Fifth General Principle of Education.)

**The Practical Value of Drawing.** The practical advantages of drawing are as follows: (1) It is the almost indispensable servant of text-books, furnishing pictures that surpass the text in power to express ideas, feelings, and purposes. (2) It is equally indispensable in oral instruction. Statistics show that, all other things being equal, the school-teacher who understands drawing surpasses his fellows in the power to interest his pupils, and thus in the power to instruct. (3) It is an indispensable equipment of artists, architects, surveyors, etc. (4) The habits and tastes which drawing develops fit pupils for better service in various vocations. "The Committee of Fifteen" says, "It prepares the future workman for a more

useful and lucrative career, inasmuch as superior taste commands higher wages in the finishing of all goods."

**The Training of Teachers of Drawing.** If drawing is as important as just explained, it devolves on the public schools to offer adequate courses. Teachers, accordingly, need the following training : (1) Thorough training in drawing itself. Such training, as elsewhere stated, is needed in the *art* as well as in the *science* of teaching drawing. Without such proficiency the teaching of drawing is likely to be a sorry failure. (2) Thorough training in the principles and methods of teaching drawing is necessary. Since this topic is the burden of the present chapter, it is hoped that the matter may not require further discussion.



## CHAPTER XII.

## MANUAL TRAINING.

THE pedagogics of manual training is concerned with (1) The Nature of Manual Training, and (2) Instruction in Manual Training.

## A. THE NATURE OF MANUAL TRAINING.

“Manual training, in the strict sense of the term, would mean simply the training of the hand; but as currently used with reference to education, the words indicate such employment of the hand as will at the same time train the eye to accuracy and the mind to attention. The scientific element, or the teaching of science pure and simple, is not necessarily involved in the expression. As, however, pure science can scarcely be taught without looking somewhat toward its applications, so manual training cannot be made an effective educational process except by constant reference to the broad foundation in the mathematical, physical, and natural sciences upon which it rests.” Two subjects deserve our special attention: (1) The Tasks of Manual Training, and (2) The History of Manual Training.

**The Tasks of Manual Training.** In manual training, as defined in the foregoing quotation, the pupil is taught how to use hand-tools in the interests of the hand, eye, and mind. This complex purpose implies (1) Instruction, and (2) Exercises.

*Manual-Training Studies.* The manual-training pupil needs very definite knowledge about the following things: (1) The construction of hand-tools, (2) The uses to which these tools are to be put, (3) The care which must be taken of hand-tools,

(4) The history of hand-tools, (5) The choice of materials (paper, wood, metals) according to their qualities, and (6) Mechanical drawing, blue prints, etc.

*Manual-Training Exercises.* Inasmuch as manual training aims at the correlation of the hand, the eye, and the mind, the pupil must put all instructions into practice. Exercises in *construction* must, therefore, be assigned. It is not enough that in these exercises the pupil is required to draw what is proposed for construction, and to measure off the proposed parts: he must also be required to justify his choice of tools and materials, and be held responsible for the condition of his tools.

**The History of Manual Training.** "The principle of the manual-training school exists in the kindergarten, and for that principle we are indebted directly to Froebel, and indirectly to Pestalozzi, Comenius, Rousseau, and Bacon. But it was reserved for Russia to solve the problem of tool-instruction by the laboratory process, and make it the foundation of a great reform in education. The initiatory step was taken in 1868 by M. Victor Della-Vos, director of the Imperial Technical School of Moscow."

*Manual Training in the United States.* The Russian system of manual training soon found favor in America. Dr. John D. Runkle, president of the Massachusetts Institute of Technology in 1876, was greatly pleased with the collection of hand-tools and samples of shop-work which he saw in Philadelphia. He recommended the system, and it was adopted by the famous Boston institution. "The second manual-training school in this country was founded as a department of Washington University, St. Louis, Missouri, by Dr. C. M. Woodward. The first class was graduated in June, 1883." "Considerable progress in manual training has been made in the State agricultural colleges of the country." "The most pronounced success has been achieved at Purdue University, In-

diana, under the directorship of Professor William F. M. Goss, who graduated from the School of Mechanic Arts of the Massachusetts Institute of Technology in 1879." The most comprehensive manual-training school in the world is Professor Felix Adler's School in New York City. The Chicago Manual-Training School, the first independent educational institution of the kind in the world, was founded in 1883. Dr. Henry H. Belfield was chosen the first director. The school was well equipped from the beginning. It offers courses in "carpentry, wood-turning, pattern-making, iron chipping and filing, forge-work, brazing and soldering, the use of machine-shop tools," and in such other branches as seem to be necessary supplements.

The State of Pennsylvania has welcomed manual training into many of her schools. The system was introduced in the Pennsylvania State College, experimentally, about twenty years ago. It was an outgrowth of the Russian idea, and the course is substantially that of the Chicago school. Manual training was made a part of the course of study in Girard College, Philadelphia, in 1882, and the experiment has proved a very great success. The public schools of Philadelphia offer manual training to all grades of pupils. "There are kindergartens (sub-primaries) for children from three to six years of age, and an industrial art department for all the students (of both sexes) of the grammar schools. In this latter department the course of training comprises 'drawing and design,' 'modelling,' 'wood-carving,' 'carpentry and joinery,' and 'metal-work.' Special provisions have been made for boys of the Twelfth grade, or any higher grade, provided the boys are fourteen years of age." Dr. James MacAlister deserves the gratitude of the city for his part in the adoption of the system.

*Prospects.* The prospects are that manual training will gradually find a place in all the States of our country and in all civilized nations. About twenty-five States have already

introduced the system in certain schools. (1) Among the great cities that offer courses of manual training are Boston, New Haven, Albany, New York, Philadelphia, St. Paul, and Omaha. (2) The normal schools are almost unanimous in adopting the manual system. (3) Among the colleges and universities that offer extensive courses in manual training are Pennsylvania State College, Lehigh University, Cornell, and Atlanta. (4) Boston, New York, Philadelphia, Pittsburgh, Toledo, and other cities offer excellent courses of manual training to girls. (5) Although manual training in the public schools of Europe can scarcely be called educational, since the pupils usually make articles for household use, the purpose therefore being purely industrial, and the mental culture received the mere accident of a mechanical pursuit, yet there are beginning to be approaches to the Russian idea. This is probably the tendency now in Denmark, France, Germany, Norway, Sweden, etc. In Nääs, in Sweden, there is a seminary for the training of *sloyd* teachers. (6) The prospects of our *rural* schools seem to be brightening. "It is sometimes said that the boys and girls in the country schools have less need of this kind of instruction than those of town or city schools, for the reason that their daily employments about the farm or in the household give them a readiness in performing common tasks which the less favored city boy seldom acquires; but while there is truth in this observation, it is also true that the range of such employments is comparatively limited, and that they are not generally so conducted as to cultivate habits of precision and carefulness in the performance of them. Systematic manual training would give to such boys and girls a variety of exercises and of skills which only the favored few can otherwise acquire. We believe that the natural aptitude for such exercises, fostered as it is by their circumstances, would produce even better practical results there than in schools of the other kind. The case of Sweden fur-

nishes most interesting evidence of the ease and success with which such a system can be introduced into rural schools when it is once undertaken, and the manifold advantages resulting from it. But whatever may be the fact upon this point, it requires but a moment's reflection to see that the most serious obstacle to the introduction of such a system throughout the entire system of schools is, at present, the lack of a sufficient number of properly trained teachers." This obstacle can be removed. "The experience of Sweden and of France show conclusively that a body of teachers can be very rapidly formed." "In Sweden it is found that an ordinary teacher, by spending six weeks in one year and five weeks in the following year in a special course of manual training, can acquire all that is necessary for teaching its elements successfully." It is earnestly recommended (1) "That the law require every district, in its subsequent erection of buildings for school purposes, to make suitable provisions for a room or rooms to be used for the purposes of manual training"; and (2) "That provision be made or authorized for the grouping of rural schools, for purposes of manual training, in such a way that either the scholars from schools included in each group may go in sections from each school to some one conveniently located, there to receive instruction in manual training, or that a special instructor in manual training may be appointed, whose time shall be assigned to each school in turn."

#### B. INSTRUCTION IN MANUAL TRAINING.

The important features of instruction in manual training may be conveniently studied under the following heads: (1) The Courses of Manual Training; (2) The Methods of Instruction; and (3) The Importance of Manual Training.

## I. THE COURSES OF MANUAL TRAINING.

The ends in view and the pupil's possibilities suggest three courses of manual training: (1) The Elementary (Imitative) Course; (2) The Intermediate (Rational) Course; and (3) The Higher (Special) Course. (See Principles of "Knowledge" and "Instruction.")

**The Elementary Course.** The studies and exercises of all the courses must be selected as means to ends.

*Ends.* The child learns to do a hundred things by doing them long before it can understand the theory of the things. It is economy in education to give all such lessons, not only to gain so much time, but especially also to develop those fundamental ideas and judgments upon which to build subsequent training for the hand, eye, and mind. These are the ends, therefore, of the elementary course.

*Elementary Studies and Exercises.* In pursuit of the ends in view, the first six years of the child's school-life may profitably be devoted to the following course of studies and exercises in manual training: (1) Exercises in kindergarten constructions and inventions. Beginners in school may lay splints, build with blocks, plait, fold, weave, and model. Many of these exercises can be combined as busy work with other lessons. (2) Exercises in writing and drawing, as indicated in the elementary courses (see pages 137, 335). There should also be such elementary exercises in mechanical drawing as may prepare the pupil for exercises with hand-tools. (3) Exercises in the uses and care of simple hand-tools, such as the jack-knife, hammer, gimlet, scissors, etc. In these exercises card-board and wood can be worked into various easy structures. The purpose of training the *mind* in correlation with the hand and eye should always be kept in mind. The necessary place for work, and the appropriate materials and tools, are not hard to supply.

**The Intermediate Course.** Just as the ends of this course are different from those of the elementary course, so the studies and exercises of the course must be.

*Ends.* The purposes of the intermediate course in manual training are as follows : (1) To develop such manual skill as should be common to the great mass of our population ; (2) To add to such skill so much theory as may be necessary to make tool-practice rational as well as mechanical ; and (3) To make the course a supplementary means in the education of the hand, eye, and mind. It should be possible to attain these ends between the ages of twelve and sixteen, since the great majority of pupils leave school at about sixteen years of age.

*Intermediate Studies and Exercises.* In pursuit of the ends in view, the following intermediate course of training is suggested : (1) Drawing as proposed in the chapter on that subject (see pages 342, 343). (2) Paper sloyd and wood sloyd of the geometrical forms, the construction to be preceded by working drawings made by the pupil, and by the teacher's written or printed directions as to the tools to be used and the proper care ; (3) Exercises and studies in wood-carving, modelling, carpentry and joinery, etc., according to the capacity and time of the pupil. These tasks must be very carefully graded. In carpentry and joinery, special attention should be paid to working-drawings and judgment in the use of tools. There should be simple exercises in hammering, chiselling, squaring, halving, dovetailing, mortise and tenon work, boring, planing, sawing, grooving, framing, gauging, beveling, dowelling, champfering, mitreing, wedging, sandpapering, filing, etc. Theory should be combined with practice in such proportion as may seem best for the particular pupil in question. Two or three hours a week should be given to these tasks.

**Higher Courses in Manual Training.** The special ends

in view in higher courses of manual training will, of course, determine various distinct studies and exercises.

*Ends.* The following distinct purposes may be recognized in higher courses of manual training: (1) To develop such superior skill as may be desirable in our high-school pupils, provisions for both sexes being made; (2) To prepare pupils for higher institutions just as they are prepared in other studies; (3) To prepare teachers to teach manual training and to make such apparatus as they may need in teaching other branches; and (4) To equip men and women for special vocations in the industrial world.

*Higher Studies and Exercises.* (1) In high schools the lessons in manual training will differ from the intermediate course chiefly in their greater complexity, but also in the correlation of various tasks with lessons in physics and mathematics. (2) The manual-training tasks of preparatory schools must be determined, as in case of other studies, by reference to the curriculum of the higher institution for which preparation is intended. (3) Normal schools should offer courses corresponding to the work which ought to be expected of them in the public schools, etc. In the interests of physiology, anatomy, psychology, physics, color-work, etc., there should be courses in chart-making, clay-modelling, photography, mechanical drawing, etc. The greatest pains should be taken to make the teacher's course an effective instrument in his own education, and to fit him or her to teach manual training effectively. (4) For outline of courses in higher institutions the reader is respectfully referred to the catalogues of Pennsylvania State College, Cornell University, Lehigh University, and the Massachusetts Institute of Technology.

## II. METHODS OF INSTRUCTION IN MANUAL TRAINING.

The features that are of special interest at this point may conveniently be treated under the following heads: (1) Mate-



rial Equipments ; (2) Preparation of Lessons ; and (3) Recitation of Lessons.

**Material Equipments.** The introduction of manual training into our schools requires (1) a room suitably equipped with work-benches, etc., (2) the tools adapted to the purposes in hand, and (3) a supply of card-board, wood, etc.

*The Manual-Training Room.* In country districts economy requires that a shop be fitted up in such a way as to accommodate pupils of all ages. In towns and cities a special laboratory should be provided for the schools of each grade, the pupils of such schools coming for their lessons at set times, and to a teacher in charge of such shops. Normal schools, colleges, etc., require a series of rooms for courses in carpentry, turnery, moulding, etc., the ends in view determining the special provisions.

*Manual-Training Tools.* In district schools the common hand-tools in carpentry, joinery, etc., must suffice. Inasmuch as the same shop can be made to suffice for the various schools of one grade, towns and cities can afford to purchase a greater variety of tools. The special purposes of manual training in normal schools and special schools must determine the variety of tools to be used.

*Working Materials.* All manual-training laboratories must, of course, be supplied with suitable paper for drawings, blue prints, sloyd, etc. ; with soft, medium, and hard wood, adapted to the purposes in hand ; and with such other materials as teachers may require.

**Preparation of Manual-Training Lessons.** Manual-training lessons require preparation on the part of teachers and pupils.

*The Teacher's Preparation.* (1) The working materials must be selected and put into available shapes. The teacher should also be perfectly familiar with the natural history, the physical qualities, and industrial values of the materials to be

used in all lessons. (2) The ideal teacher of manual training inspects his equipments daily, studies the powers of the tools with which he must deal, and keeps every instrument in working condition. (3) Every lesson should have a definite end in view. The teacher must ascertain this end in the present progress of the pupil, and plan such exercises as shall serve as means to the end in view. The successive recitations must hang well together, and constitute a perfect series from the simple to the complex. To this end the lesson-plan must so combine tools in various constructions as to develop the highest manual skill in connection with the best training for the eye and mind. (See Goss.)

*The Pupil's Preparation.* (1) It is not to be expected of elementary pupils that they prepare assigned lessons, since they need constant supervision. (2) Pupils of grammar schools, high schools, and special schools must be required to do various things between recitations. Normal-school students, for example, should be required to prepare working-drawings, blue-prints, etc., according to assigned problems, and to finish charts for various pedagogical uses, paper-sloids, etc. The time and labor thus demanded of pupils should not be too great, and proper differences should be observed in masculine and feminine assignments.

**Recitation of Manual-Training Lessons.** The plan of manual-training recitations is determined by the ends in view, *i.e.*, by the tasks of the various grades.

*Elementary Recitation.* Since the tasks of the elementary grade are chiefly those of the kindergarten, drawing, form-study, etc., the lessons must, of course, be *imitative* in essence. In other words, the teacher illustrates and the pupils imitate.

*Intermediate Lessons.* (1) With intermediate pupils theory must be combined with imitation. In other words, the teacher must illustrate the use and care of the tools to be used, test the pupils' knowledge of working materials, etc., point out

sources of information, impart useful and interesting general instruction, discipline the pupils' judgment, correct false ideas, supervise exercises, etc. The best possible order should be preserved throughout these recitations. (2) Lessons to be prepared should be definitely assigned, necessary suggestions offered, etc. (3) In the interests of economy and discipline a supply-account with pupils must be opened. (4) An effective system of inspecting work done is indispensable. The teacher must make sure that all work done by pupils in recitation hours and between recitations is the pupils' own work. All passing marks must be recorded in the pupil's favor. The pupil must be made to recognize that absolute honesty is the indispensable test of superior worth in manual-training attainments.

### III. THE IMPORTANCE OF MANUAL TRAINING.

The interests of pedagogics require at least a brief notice of the importance of manual training. Our reflections may be summed up under the following heads: (1) Culture, (2) Instruction, (3) Utility, and (4) The Training of Teachers.

**The Culture-Value of Manual Training.** The correlation of the hand, eye, and mind, as required in educational manual training, makes it one of the most effective instruments in modern education. This correlation itself, as those who understand the subject teach us, is one of the fundamental conditions of mental growth. The student of pedagogics will find it easy to show that the whole pupil (intellect, feeling, will, and body) is brought into effective service in the various manual training lessons.

**The Instruction-Value of Manual Training.** As a supplement of physics, pedagogics, and other studies, manual training offers illustrations, confirms theories, and stimulates scientific observations. The knowledge thus acquired, together with its inspiration, is its own high reward.

**The Utility of Manual Training.** From an industrial stand-point manual training needs no apology. The history of its introduction and progress is its sufficient defence.

**The Training of Teachers of Manual Training.** The importance of manual training and its rapid introduction into our schools call for trained teachers, and especially for teachers trained in the pedagogics of the subject. (See Ham's "Manual Training," "Bench Work in Wood," by Goss, and "Industrial Education," 1887-89, Pennsylvania Commission.

## CHAPTER XIII.

## PHYSIOLOGY.

THE pedagogics of physiology is concerned with two topics : (1) The Nature of Physiology, and (2) Instruction in Physiology.

## A. THE NATURE OF PHYSIOLOGY.

Three general topics deserve our present attention : (1) The Subject of Physiology ; (2) The Psychology of Physiology ; and (3) The History of Physiology.

**The Subject of Physiology.** In the widest application of the term physiology denotes the study of the organs, functions, and health of the human body.

*Organs of the Body.* The body is a composite structure, every part of which has some special office to perform. It is in this sense of the term that we speak of the stomach, the liver, the teeth, etc., as the organs of the body. In a very general way the organs of the body may be classified as bones, muscles, and nerves.

*Functions of the Body.* The work for which an organ of the body is designed is termed its function. It is in this sense that we speak of mastication, salivation, deglutition, digestion, assimilation, etc. In a very general way the functions of the body may be classified as locomotion, conservation, and sensation.

*Health of the Body.* When all the organs of the body perform their offices effectively, so that life continues in perfection, the body is said to be healthy. The condition, as statistics show, depends especially upon heredity, environment, food, sleep, exercise, clothing, and mental life. The fact that physical health has so much to do with our general success

makes the preservation of health and its improvement the first concern of education.

**The Psychology of Physiology.** The learner becomes acquainted with the facts of the body by *observation*, he discovers the laws of his physical life by *induction*, and makes these his rules of conduct by *deduction*.

**The History of Physiology.** The study of physiology began in the earliest ages of the world, but it was not until modern times that physiology became a branch of study in our public schools. Its recent introduction into all the grades of our schools is a great step in advance. The masses are thus put into possession of knowledge that in the most practical sense is power indeed. The world at large is coming to see the importance of such knowledge, and teachers are required to give the same evidence of physiological training as of training in other branches.

#### B. INSTRUCTION IN PHYSIOLOGY.

Teachers of physiology should understand the following features of the work: (1) The Courses of Instruction; (2) The Methods of Instruction; and (3) The Importance of Physiology.

**Courses of Physiology.** The demands of culture and the needs of life require three courses in physiology. The interests of general education require a common-school course in physiology; the needs of teachers and psychologists must be supplied in special courses; the medical profession needs as extensive a course as can be found.

*Common-School Physiology.* (1) The common-school course in physiology should begin in the pupil's earliest years and continue through all grades. The first years should be devoted to such facts as children ought to know. The subjects to be taught must be left to the teacher's judgment, though elementary text-books should give direction to the teacher's

choice of subjects. The obvious laws of the body, as well as the facts, should be studied in grammar grades. The high school should begin to inquire into complex features of physical life.

(2) The lessons of lower grades should be made as concrete and attractive as possible. Pictures, drawings, charts, etc., will often be found very helpful, but books are out of place in elementary physiology. Practical experiments should be introduced in grammar grades, and a brief text-book should be made the guiding thread of the lessons. Lessons should be assigned, prepared, and recited. Two or three lessons of twenty minutes each week will suffice. The pupil should be led from facts to principles, and from principles to rules of life. The study of physiology in high schools should be made as thoroughly scientific as possible. In addition to the regular work which is to be done in text-books, special problems should be assigned to the pupils, the pupils making original observations and arriving at independent conclusions. Special lessons on stimulants, narcotics, poisons, and emergencies are of the greatest importance.

*Higher Physiology.* (1) The teacher needs an extensive and accurate training in physiology. The smatterer will teach untruths and harm the cause of health. In addition to a complete course in physiology, a thorough training in the methods of teaching it is indispensable. (2) The study of some phases of psychology is impossible apart from physiology. The psychologist needs a special training in the physiology of the nervous system. (3) It is not within our scope to go into details with regard to the physiology of the medical profession.

### III. IMPORTANCE OF PHYSIOLOGY.

The merits of physiology as a means in education are most conveniently summed up under the following heads: (1) The

Culture-Value of Physiology ; (2) The Instruction-Value of Physiology ; and (3) The Life-Value of Physiology.

**The Culture-Value of Physiology.** The teacher who understands his business can make physiology the means of superior culture. The study of physiology is an ideal opportunity in the development of right habits of observation, induction, and deduction. To be of any value all the observations must be accurate, and many conclusions at which the pupil arrives by induction, as well as the life-rules at which he arrives by deduction, must undergo continual correction. Since the concrete welfare of the pupil is constantly at stake in these necessities, they tend to develop not only the intellect but also the heart and will.

**The Instruction-Value of Physiology.** As a consequence of the close relation between the body and the mind, the knowledge of the body is often a preparation toward a better understanding of the mind. Many of the mysteries of life so dreadful to the uninitiated disappear in the light of physiology.

**The Life-Value of Physiology.** The study of physiology tends to save life, to promote health and happiness, to improve mental and physical labor, and to decrease immorality.



## CHAPTER XIV.

## PHYSICAL CULTURE.

THE pedagogics of physical culture has to do with two general problems: (1) The Nature of Physical Culture, and (2) Instruction in Physical Culture.

## A. THE NATURE OF PHYSICAL CULTURE.

An exhaustive inquiry into the nature of physical development is impossible at this point. Two topics, however, deserve our attention: (1) The Necessity of Physical Culture, and (2) The History of Physical Culture.

**The Necessity of Physical Culture.** The instinctive prompting to play disappears when the body matures; its mission has then been performed. It must, however, not be inferred that when the body has arrived at its maturity physical activity is no longer necessary. In this matter, as in others, the guardianship of the body is merely transferred from instinct to reason. Inquiry into the process of physical life confirms this theory. The process of physical life consists of two complementary processes commonly denoted by the terms assimilation and elimination, and this complementary relation must be maintained in maturity as well as in the stages of development. The agencies in the maintenance of this complementary relation are nutrition and repair, muscular activity, and neurosis. The remarkable thing in this complex agency is the fact that *muscular activity* is the indispensable condition of nutrition and repair and of normal neurosis. (See Physiology.) A system of *muscular exercises* must, accordingly, be devised for the development and health of the body.

*The Relation of the Body and Mind.* The mind, as psychophysics teaches, is in the closest sympathy with the body. Abnormal neurosis is always a mental misfortune. The mental life of a person whose physical health is perfect is generally also normal, and much of a man's success can often be traced directly to a fine physical system. Accordingly, the importance of physical culture is to be measured not only by its physical, but also by its *intellectual* and *moral* consequences.

**The History of Physical Culture.** Systematic physical culture probably attained its highest possibilities in ancient times. The preservation of nations then depended very much upon physical prowess in personal combat, as in Greece and Rome. Then, too, Greece "paid so much attention to pure gymnastics because the beautiful was worshipped as the highest manifestation of the divine." The ascetic misconception of the relation of the body and mind led the Middle Ages to despise the body and ignore its just claims. It was not until Locke's time that educators began to understand the true relation of the body and mind. The Philanthropinists laid great stress on physical culture. The "new" education, accepting the teachings of Christ and the conclusions of physiological psychology, has for some years squarely faced the problem of physical culture in our schools. The recent introduction of physiology into the schools, and the provisions made by normal schools and special schools for the training of teachers, will do much toward the intelligent general introduction of physical culture. The old prejudice against the body is fast disappearing from the minds of the general public, as may be seen in the increased interest of all classes in gymnasiums and athletics. The time is fast approaching when we shall require all teachers to give as much evidence of their fitness to teach physical culture as reading and arithmetic. It is to be hoped, however, that in the almost violent

reaction in favor of the body the American people may not prostitute physical culture to the interests of brute force and acrobatic show.

## B. INSTRUCTION IN PHYSICAL CULTURE.

In order to do effective work in physical culture the teacher must understand, (1) Classification of Exercises; (2) Principles of Physical Culture; (3) Courses of Exercises; (4) Methods of Instruction; (5) The Adoption of a System; and (6) The Importance of Physical Culture.

**Classification of Physical Exercises.** The most convenient and therefore the most appropriate classification of physical exercises is the common division into (1) Lower-Limb Movements; (2) Upper-Limb Movements; and (3) Trunk Movements. Some exercises belong purely to only one of these classes, others are a combination of two classes, while many of the best exercises belong partly to all classes.

*Lower-Limb Movements.* Among the common exercises for the lower limbs are walking, running, jumping, and leaping. Swimming, bicycling, base-ball, and foot-ball involve especially the lower limbs, but belong at the same time to the other classes.

*Upper-Limb Movements.* Among the common exercises for the arms are swinging, lifting, and throwing. Indian clubs or dumb-bells may be added to the swinging movements. Exercises with poles, bars, chest-weights, etc., as well as climbing and carrying, are complex forms of lifting. Balls, quoits, nine-pins, etc., are convenient in throwing.

*Trunk Movements.* Among the common exercises for the trunk are swimming, riding, and boxing. Since these movements are generally impossible, substitutions must be found. The most convenient substitutes are breathing exercises, imitations of rowing, systematic bendings of the body, and imitation boxing. These exercises are commonly combined with

others meant more especially for the upper and lower limbs and for the neck.

**Principles of Physical Culture.** In physical culture, as in other studies, the courses of exercises and the methods of work should be selected as means to ends. A knowledge of the following principles is essential to intelligent selection in these matters.

1. *The right ideal in physical culture is to develop the body into the best instrument of life.*

In the statement of this principle the term *life* is to be taken in its largest sense, the sense in which it was used in the Fifth General Principle of Education (page 39). To be the best instrument of life in the largest sense, the body must have *health, strength, skill, and grace*. (1) Health is the condition of normal mental life, as set forth in the first part of this chapter. (2) Strength is the indispensable equipment of labor and endurance. (3) Skill, the ability to do a thing quickly and well, is an economic advantage without which no one can successfully compete in the arts of life. (4) Grace, it is true, is not a physical necessity. It is, however, a great social advantage, and as such often has practical and moral consequences. Moreover, there is conscious happiness in the possession of a fine body, especially when this possession is combined with the best refinements.

In order that health, strength, skill, and grace may prove a blessing the body must be made the servant of intelligence, refinement, and highest purposes. Apart from right habits of subordination, physical advantages often prove to be a curse.

2. *It is through corresponding exercises in muscular contractions and expansions that all desirable physical virtues must be developed.*

Since contraction and expansion are the only possibilities of muscular activity, all the possibilities of physical culture must

lie along these lines. It is through obedience to the laws of *habit* that the possibilities of physical culture must be realized. In other words, the exercises of any system of physical culture should be exercises in those things which are to become the virtues of the body. Accordingly, health must be developed through normal use of the organs in question, strength can be developed only by a long course of strong contractions and expansions, skill results from practice in rapid movements, and grace is the reward of cultivated self-possession in muscular movements. The will must be required to subordinate all exercises to the dictates of intelligence and refinement.

(3) *The natural stages of development must be respected in physical culture.*

Experiment seems to show that the natural series of play-interests is a manifestation of the trend of the needs of the maturing body. It has also been proved that the series of the pupil's possibilities coincides with the series of his interests and needs. Thus we learn that in order to adapt exercises to individual pupils the teacher must study individual interests. Inasmuch as there is a general similarity of individual interests, a true system of exercises can be founded upon the general trend of play-interests. The earlier physical movements are generally *imitative*, the later ones *rational* and original. A thread of concentrations, each emphasis being the centre of correlations, seems to run through both the imitative and the rational series of the physical activities of the body. In other words, Nature seems to have special epochs of development for the various parts of the body, but will not, while laying stress on any particular part, neglect the other parts of the body. The parts to which Nature attends successively are those which seem to fall behind in the race of symmetrical development. This suggestion of Nature must ever, therefore, be the teacher's guide in dealing with individual pupils.

**Courses of Exercises.** The following outline is based upon the principles of physical culture, and is designed to be a guide to teachers :

*Courses of Exercises.*

**I. Imitation Course.**

1. Contractions and expansions of leg muscles.
  - (1) Normal.
  - (2) Strong.
  - (3) Quick.
  - (4) Graceful.
2. Contractions and expansions of arm muscles.  
Same as above.
3. Contractions and expansions of body muscles.  
Same as above.

**II. Rational Course.**

1. Complex contractions of muscles.
2. The physiology of exercises.

**III. Professional Course.**

1. Superior attainments in muscular culture.
2. The theory of physical culture.
3. The pedagogics of physical culture.\*

**The Method of Instruction.** In ideal instruction the recitation presupposes preparation. These two topics deserve our attention. (See Principles.)

*Preparation in Physical Culture.* (1) The possibilities for good or evil are so great in physical exercises that the teacher must make the very best preparations. He should choose exercises as means to definite ends in the system which he may have adopted. The ability to illustrate the exercises to be assigned is indispensable in the imitative course. The physi-

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\* The first course is suitable for lower grades, the second for high schools, and the third for normal and special schools.

ology of the proposed exercises should be thoroughly mastered before recitation. The plan of the recitation, its steps and details, should be mastered in the most definite sense. (2) In the imitative course the pupil's preparations must consist mainly of repetitions of exercises with which the pupil has become familiar. In the rational course the pupil must also be required to study regularly assigned lessons on the physiology of exercises already practised or of those to be used in the next recitation. In the professional course the requirements of the rational course must be variously supplemented with special reference to the pedagogics of the subject.

*The Recitation in Physical Culture.* (1) In the imitative course the recitation must consist of observation and imitation. In other words, the teacher must illustrate the movements to be taught; the pupil must observe and imitate. The movements should be repeated until the ends in view have been attained, but the pupil's strength and patience must never be taxed too severely. (2) In the rational course the recitation may consist partly of theory and partly of practice, or separate periods may be devoted to each. The recitation in theory will resemble a recitation in physiology. The recitation in *movements* must consist of commands and obedience. In other words, the teacher states what is to be done, illustrates complex requirements, commands successive movements of strength, rapidity, and grace, while the pupils promptly obey every order to the best of their ability. Prompt obedience is of utmost importance as a means in subordinating the body to the mind and as a training in concerted moral actions. (3) The recitation plans of the professional course in physical culture are practically the same as those of the intermediate course.

**Adoption of a System.** In our times the teacher has many alternatives from which to select a system of exercises for a school. Among the best systems of physical culture are

the Swedish, the military, and the Preece systems. Probably the Swedish and the military systems should be combined in higher courses to produce the best results. The best system for public schools is the Preece system; it aims at proper physical habits and is decidedly moral and æsthetic. The most gratifying results have been obtained in many cities. The Preece manual for teachers, published by C. W. Bardeen, Syracuse, New York, is very complete, and deserves a place in every teacher's library.

**The Importance of Physical Culture.** Systematic physical culture is not absolutely necessary in country districts where pupils find many opportunities outside of school hours to develop their bodies, and yet there are reasons why such a system as the Preece or the Swedish should be introduced into every rural school. Improper habits of walking, standing, sitting, breathing, etc., are alarmingly common even in the rural schools. In towns and cities systematic physical culture seems indispensable. Opportunities for playing, etc., are harder to find, school grounds are often quite too small, and the out-door hours too few. In the interests of body, mind, and morals, city schools and town schools should adopt some system of physical culture. (See Necessity of Physical Culture.)



## CHAPTER XV.

## SINGING.

THE problems with which the pedagogics of singing is concerned are as follows: (1) The Nature of Singing, and (2) Instruction in Singing.

## A. THE NATURE OF SINGING.

The necessary knowledge of the subject to be taught is the first concern of the ideal teacher. It is assumed that in the case of singing the teacher should understand the following phases of the subject: (1) The Production of Tones; (2) The Representation of Tones; (3) Reading; and (4) The History of Singing.

**The Production of Tones.** In singing we have to do with sounds just as in painting we have to do with colors. These sounds of the voice are termed Tones. The tones in question are the results of physical vibration, and they differ in the number of necessary vibrations, in extent of time, in quality of voice, in stress of voice, etc. The production of tones is therefore concerned with (1) Pitch, (2) Time, (3) Quality, (4) Force, etc.

*Pitch.* The distinction of higher and lower tones is termed Pitch. In the production of tones of definite pitch, the mind is not conscious of the number of necessary vibrations of the vocal chords, but only of such vocal coördination as will result in the desired pitch. This coördination consists of difference in the tension of the vocal chords, and depends for much of its success on faithful practice. For fuller explanation the reader is referred to Natural Philosophy.

*Time.* The prolongation of a tone is termed its Time. Thus, we speak of long and short tones, of slow and quick time. Two things are necessary in the production of tones of definite length, namely, control of the vocal chords and judgment in the measure of the tones in question. As in the case of pitch, practice tends to make perfect.

*Quality.* The differences of voice denoted by the words sweet, mellow, brilliant, etc., are termed Quality, or Timbre. Some of these qualities are voluntary possibilities; others are individual differences over which the persons in question have almost no power. Systematic voice-culture will, however, do much to improve the qualities of any voice.

*Force.* The differences of stress denoted by the words soft, medium, loud, etc., are termed Force. The variations in question are voluntary possibilities limited only by the physical powers of the singer.

*Rhythm.* In a metrical succession of tones the system of accent and time is termed Rhythm. The word "time" is often synonymous with "rhythm." Thus, when we speak of "three-fourths" time we mean a succession of tones in which three "quarter" notes (or equivalents) form the measures regularly with one accent to each measure and in regular position. It thus follows that rhythm is a derivative of time and force.

*Melody.* Rhythmical succession of single tones is termed Melody. The word "tune" is a popular substitute, as in the sentence, "He cannot keep a tune."

*Harmony.* Simultaneous tones of such difference in pitch as satisfies the æsthetic sense are said to be Harmonious. One pulse of such harmony is termed a Chord. The systematic construction of successive chords is termed Composition. The fundamental pitch in melody and composition is termed the Key. Systematic progress from the key is termed the

Scale. Change of key in melody and composition is termed Transposition.\*

**The Representation of Tones.** In singing as a species of language there are three logical steps: (1) The production of tones, the visible representation of tones, and the production of tones thus represented to the eye. It is with the second task that we have to do at this point.

*Necessity.* The necessity of visible representation of tones appears from two considerations: (1) Apart from such representation song would generally perish with its first production, and (2) The visible representation of tones is an indispensable means in the pupil's education.

*Method.* All methods of representing tones to the eye have their basis in psychophysics, and the historic development of such methods is subject to the accidents of invention. In their fuller aspects these considerations belong to the history of music. It is with the conventional method of representation that we are concerned at this point. (1) Difference in "pitch" is generally represented to the eye by means of differences in distance from a base line. On the conventional "staff" the pitch in question is denoted by the letters *c, d, e*, etc., or by the figures 1, 2, 3, etc., or by the names *do, re, mi*, etc., or by the shapes of the notes employed. "Melody" and its development in "composition" are generally represented by progress from left to right on the staff, probably in imitation of our modes of "writing." The "key" of a melody or composition is generally denoted by means of so-called "flats and sharps." The "scale" consists of a natural "octave" of tones and its repetition. Letters, names, etc., are employed in

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\* Those features of tone-production which may be summed up under the head of "pronunciation," although of the highest importance to artistic singing, constitute the special domain of "Voice Culture," whose purpose it is to develop such vocal technique as may completely express the *mental* states of the singer.

its description. (2) Difference in "time" is generally represented to the eye by means of differences in the form of the "notes." (3) Differences in "quality" and "force" are generally represented to the eye by means of technical terms or equivalent signs, as *con espressione*, *pianissimo*, *p*, *f*, etc. (4) "Rhythm" is represented to the eye by means of the division of the "staff" into "measures" composed somewhat regularly of longer and shorter tones, the "theme" of a song determining whether the measures are to be iambs, trochees, anapests, dactyls, or some other arrangement. Difference in rhythmic speed is indicated on the staff by means of technical marks, as in the case of "quality" and "force." Artistic pronunciation is supervised by similar means.

**Reading.** In its entirety "singing from notes" consists of two complementary phases in the following order: (1) Instruction, and (2) Rendition.

*Instruction.* The process of "singing from notes" begins with the singer's mental construction of the "tune" represented on the "staff." The conditions of success in this process are (1) the singer's mastery of the system of representation, and (2) the power to construct mentally that which is represented physically. The former task is possible for the common mind; the latter is the prerogative of talent.

*Rendition.* Oral construction begins where instruction ends, and completes the process of "singing from notes," inasmuch as it is the mind's mode of expressing its contents and conveying its moral messages. The conditions of great success are (1) intellectual mastery of means, (2) spirituality, and (3) exercise.

**The History of Singing.** The purpose in hand forbids extensive reference to the history of singing. The subject, however, demands some attention. The "place" which singing now occupies in our schools will be better understood by reference to its history. The following topics will, therefore, be briefly considered: (1) The development of singing as a

study ; (2) Its institutional services ; and (3) Its introduction into schools.

*The Evolution of Singing.* Simple melody, without nice discrimination between the different degrees of pitch, was probably the limit of musical attainment for a long period of time in the earliest history of the race. "The Greeks reduced musical intervals to mathematical ratios, introduced the chromatic scale, and distinguished the major and minor intervals in the diatonic scale." Harmony was born much later. "In the sixteenth century music was cultivated with great devotion and success in Italy." Oratorios and operas were the fruits of this devotion. "Operatic music culminated in Italy in Rossini of the present century." Then followed the German masters, Haydn, Weber, and others. France was not far behind, and produced such men as Auber, Meyerbeer, and Halévy. England and English singers come last in the list of great efforts in the history of music.

*The Institutional Services of Singing.* Singing, like its instrumental associate, has ever been the welcome guest of society, the indispensable handmaid of religious worship, the spirit of valor in war, the divinest ideal of art, and a mighty friend of education. The most ancient as well as the most modern peoples have held music in the highest esteem. (See General History and History of Education.)

*The History of Singing in Schools.* Probably all civilized nations paid some attention to singing in schools. Among the Oriental nations the Egyptians and the Jews laid great stress on singing as means of culture. Singing was an essential element in the schools of Greece, and Greek philosophers had much to say about the merits of music. Rome followed somewhat in the footsteps of Greece. Singing belonged to the curriculum of the early Christian schools, and was the queen of the celebrated seven "liberal arts" of the Middle Ages. Modern education has given an honorable place to singing.

In Germany, France, and other European states singing has become a common-school study. America is ready to make singing a common-school study. In many cities singing is taught as systematically as reading and writing. The normal schools offer suitable courses in singing, and school boards are waking up to the importance of singing as a means in education. The prospects are that singing will become a universal study in our schools.

### B. INSTRUCTION IN SINGING.

The special pedagogical interests of singing are conveniently considered under the following heads: (1) The Necessary Courses; (2) Singing in the Public Schools; and (3) The Importance of Singing.

#### I. COURSES IN SINGING.

The nature of singing, together with the requirements of culture and the demands of life, determine the courses of singing. (See Principles.) But since the requirements of the subject and of culture are satisfied by progress from the simple to the complex, etc., in the development of lessons, only the demands of "life" deserve special consideration at this point. The following topics accordingly deserve attention: (1) Singing for the Masses; (2) The Course of Singing for Teachers; and (3) The Course for Specialists in Singing.

**Singing for the Masses.** Instruction in singing should begin in the concrete, *i.e.*, with simple melodies. The songs for children, as Froebel suggests, should be selected with special reference to their value as a means in the general culture and discipline of the pupil. The nature of singing requires that the first technical instruction should consist of exercises in (1) pitch and the natural scale, (2) time and simple rhythm, (3) timbre, and (4) force. Exercises in representation and reading should be combined with lessons on pitch, rhythm, time, etc.,

almost from the beginning. Sharps and flats should be first introduced in connection with simple melody. A course in singing from notes and in voice-culture should follow a course in chords and part songs. If singing deserves a place in common schools, it deserves the place as a means of culture, as a source of happiness, and as a means in life. (See Fifth General Principle of Education.) It is, therefore, of the utmost importance in mapping out a course of singing for the common schools to inquire into the moral, æsthetic, and practical value of the course. The importance of singing in homes, society, church, etc., should not be forgotten.

**The Course of Singing for Teachers.** Since the power of imitation is the pupil's first great possibility in the arts, economy requires that teachers of singing take as thorough a course in singing as possible. The teacher of singing should, of course, know more than he will be required to illustrate. As a stimulus to artistic teaching the teacher needs a course of training in "composition" and "voice." A course of reading in musical literature is of great importance. In addition to the course in singing, the teacher needs a thorough training in the principles and methods of teaching singing.

**The Course for Specialists in Singing.** The purpose in hand does not require extensive reference to higher courses in the divine art of singing. It will suffice at this point to call attention to the extended courses in "voice" (including the physical technique as well as the "soul" training), in "thorough bass," etc., which are possible for those whose capacity and opportunity warrant the attempts. Those courses, of course, constitute the domain of technical schools.

## II. SINGING IN PUBLIC SCHOOLS.

The problems with which we are especially concerned at this point are: (1) The Preparation of Lessons, and (2) The Recitation in Singing.

**The Preparation of Lessons.** An ideal school requires preparation on the part of both teachers and pupils.

*The Teacher's Preparation.* It is not enough that the teacher of singing has taken a course in singing and the pedagogics of singing. The best teachers believe in "daily study" as a source of inspiration, power, and economy. It is of the utmost importance that the teacher of singing fix upon some special "end" for each recitation, that he plan the necessary steps before the recitation, that he select the best means (black-board, charts, etc.), and that he settle upon the most effective method of using his means in the attainment of his ends.

*The Pupil's Preparation.* (1) Formal preparation of lessons is not to be expected of beginners in singing. (2) When pupils in singing are old enough to study "notes" formally, lessons may be assigned as in other branches. (3) In higher and special courses the teacher must, of course, insist on practice between recitations.

**The Recitation in Singing.** The nature of the subject determines the tasks of the recitation in singing, while the needs of the pupil determine the right method of work.

*Tasks of the Recitation in Singing.* Lessons on pitch, scales, time, melody, representation, reading, etc., must consist of (1) instruction to reach the pupil's intellect and feelings, and (2) exercises for the pupil's voice and will. In the accomplishment of the former task the teacher is subject to the principles of ordinary instruction; in the latter he is subject to the law of the formation of "habit," inasmuch as voice-culture consists essentially in forming right habits of voluntary utterance.

*The Recitation Method in Singing.* (1) The scientific method of instruction is as applicable to singing as to other studies. The pupil learns the facts of pitch, time, force, representation, etc., by "observation"; he passes from facts to



laws by "induction," and back to practical methods by "deduction." (2) In the development of right habits of pitch, force, etc., the pupil must be required to do whatever is to become habit until it actually becomes habit. These necessary repetitions must be so varied and adapted to the interests of the pupil as not to weary him. A skilful use of the black-board, charts, part songs, etc., will generally succeed in sustaining the pupil's interest. (3) The lessons should be as concrete as possible for elementary classes; representation (staff, notes, etc.) may lead in higher classes; fine technique is the final concern in singing. (4) Among the best systems of "notation" are those employed in the "Normal Music Course," published by Silver, Rogers & Co., 50 Bromfield Street, Boston. For detailed instruction on "method" the reader is referred to the "Teachers' Manual" of this course, or to the Mason System, published by Ginn & Co., Boston.

### III. IMPORTANCE OF SINGING.

Singing has long been regarded as a valuable educational means.

**The Culture-Value of Singing.** A course in singing tends to develop the whole pupil. (1) "It brings a valuable contribution to physical development by fortifying the lungs and giving suppleness to all the vocal organs. These organs are less liable to the many grave maladies which might affect them, especially in early years, if they have been subjected to regular exercise." (2) "By this means we provide for the education of the ear; we cultivate and refine a sense which along with vision plays a preëminent part in the intellectual existence of the child." Singing affords fine opportunities for the cultivation of memory, imagination, and thought. (3) Its effects on the sensibilities are very remarkable. This is due fundamentally to its rhythm, by means of which all species of emotion can be combined with thoughts and transformed

into volitions. The mind tends to express its sweetest sentiments and its loftiest aspirations in song. Singing touches the heart as almost nothing else can do, and thus becomes the vehicle of social, patriotic, moral, and religious influence. These moral possibilities make it important to admit within the school only the works of a pure and exalted sentiment, and, as much as possible, the productions of the great masters.

**The Instruction-Value of Singing.** The knowledge of pitch, time, qualities of voice, force, rhythm, melody, and harmony is virtually a partial conquest of such branches as reading, poetry, etc. This knowledge is also to be desired for its own sweet sake as a source of happiness. It may thus become for young people the most powerful preservative against the dangers of other pleasures.

**The Disciplinary Value of Singing.** The child loves music. Singing is, therefore, "one of the surest and most salutary means of discipline which can be employed." A song introduced at the right moment into a sleepy, languid school, or it may be into one agitated and disturbed, acts like electricity. "Music has the gift of calming children, and at the same time of urging them to activity by an agreeable excitation." Rhythm promotes self-control in physical movements, develops unity of action in large numbers, and stimulates good mood. It is an excellent recreation, giving repose from serious studies, and preparing the spirit of the pupils for subsequent tasks.

## APPENDIX.



## APPENDIX.

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### REFERENCE BOOKS FOR COLLATERAL READING.

#### PSYCHOLOGY.

1. Psychology in Education. *Roark*. American Book Company.
2. Application of Psychology to Teaching. *Hailman*. Small.
3. Apperception. *Lange*. D. C. Heath & Co.
4. Principles of Psychology. *James*. Henry Holt & Co.
5. Psychology of Children. *Tracey*. D. C. Heath & Co.
6. Studies of Childhood. *Sully*.
7. The Infant Mind. *Preyer*. D. Appleton & Co.
8. Three Years of Childhood. *Perez*. C. W. Bardeen.

#### PRINCIPLES OF TEACHING.

1. Leonard and Gertrude. *Pestalozzi*. D. C. Heath & Co.
2. Emile. *Rousseau*. D. C. Heath & Co.
3. Education of Man. *Froebel*. A. Lovell & Co.
4. Lectures to Kindergartners. *Peabody*. D. C. Heath & Co.
5. Evolution of Dodd. *Smith*. Rand, McNally & Co.
6. Education. *Spencer*. Educational Publishing Company.
7. Philosophy of Education. *Rosenkranz*. Appleton & Co.
8. Philosophy of Education. *Tate*. C. W. Bardeen.
9. Philosophy of Teaching. *Tompkins*. Ginn & Co.
10. Science of Education. *Herbart*. D. C. Heath & Co.
11. Outlines of Pedagogics. *Rein*. C. W. Bardeen.
12. Studies in Pedagogy. *Morgan*. Silver, Burdett & Co.
13. A Manual of Pedagogics. *Putnam*. Silver, Burdett & Co.
14. Essentials of Method. *De Garmo*. D. C. Heath & Co.
15. Lectures on Teaching. *Joseph Payne*. E. L. Kellogg & Co.
16. True Order of Studies. *Hill*. G. P. Putnam's Sons.

## METHODS OF TEACHING.

*Arithmetic.*

1. Grube Method of Arithmetic. *Seely*. E. L. Kellogg & Co.
2. Psychology of Number. *Dewey*.
3. Philosophy of Arithmetic. *Brooks*. Normal Publishing Company.
4. Elements of Pedagogy. *White*. Van Antwerp, Bragg & Co.
5. Normal Methods of Teaching. *Brooks*.

*Composition.*

1. Language Lessons. *Barnes*. American Book Company.
2. Elementary Lessons in English, Parts I. and II. *Knox*. Ginn & Co.
3. Practical Lessons in Language. *Conklin*. American Book Company.
4. Treatise on Punctuation. *Wilson*. American Book Company.
5. How to Write Clearly. *Abbott*. Roberts Brothers.
6. Analysis of Letter Writing. *Townsend*. American Book Company.
7. Elements of Rhetoric and Composition. *Hill*. Sheldon & Co.
8. Composition and Rhetoric. *Quackenbos*. American Book Company.
9. Practical Elements of Rhetoric. *Genung*. Ginn & Co.

*Drawing.*

1. Elements of Drawing Simplified. *Augsburg*. Educational Publishing Company.
2. System of Drawing. *White*. Ivison, Blakeman, Taylor & Co.
3. System of Drawing. *Montgomery*. Ivison, Blakeman, Taylor & Co.

*Geography.*

1. The Child and Nature. *Frye*. Ginn & Co.
2. Brooks and Brook Basins. *Frye*. Ginn & Co.
3. Teachers' Manual of Geography. *Frye*. Ginn & Co.
4. Teacher's Manual of Geography. *Redway*. D. C. Heath & Co.
5. Elements of Pedagogy. *White*. Van Antwerp, Bragg & Co.
6. Geographical Studies. *Ritter*. Van Antwerp, Bragg & Co.
7. Comparative Geography. *Ritter*. Van Antwerp, Bragg & Co.
8. Physiography. *Huxley*. ——— London, 1881.

*Grammar.*

1. English Grammar and Composition. *Reed and Kellogg*. Clark & Maynard.
2. English Grammar. *Lyte*. American Book Company.
3. English Grammar. *Welsh*. American Book Company.
4. Essentials of English Grammar. *Whitney*. Ginn & Co.
5. Grammar Land. *Nesbitt*. Holt & Co.
6. The English Language. *Meiklejohn*. D. C. Heath & Co.

*History.*

1. Stories of Pennsylvania. *Walton and Brumbaugh*. American Book Company.
2. Methods of Historical Study. *Freeman*. London, 1886.
3. Methods of Teaching and Studying History. *Hall*. D. C. Heath & Co.
4. Aids to Teaching of General History. *Sheldon*. Heath & Co.
5. History of Civilization. *Guizot*.
6. Philosophy of History.

*Manual Training.*

1. First Lessons in Wood-Working. *Compton*. American Book Company.
2. How to Use Wood-Working Tools. *Whitaker*. D. C. Heath & Co.
3. Manual Training School. *Woodward*. D. C. Heath & Co.
4. Bench Work in Wood. *Goss*. Ginn & Co.
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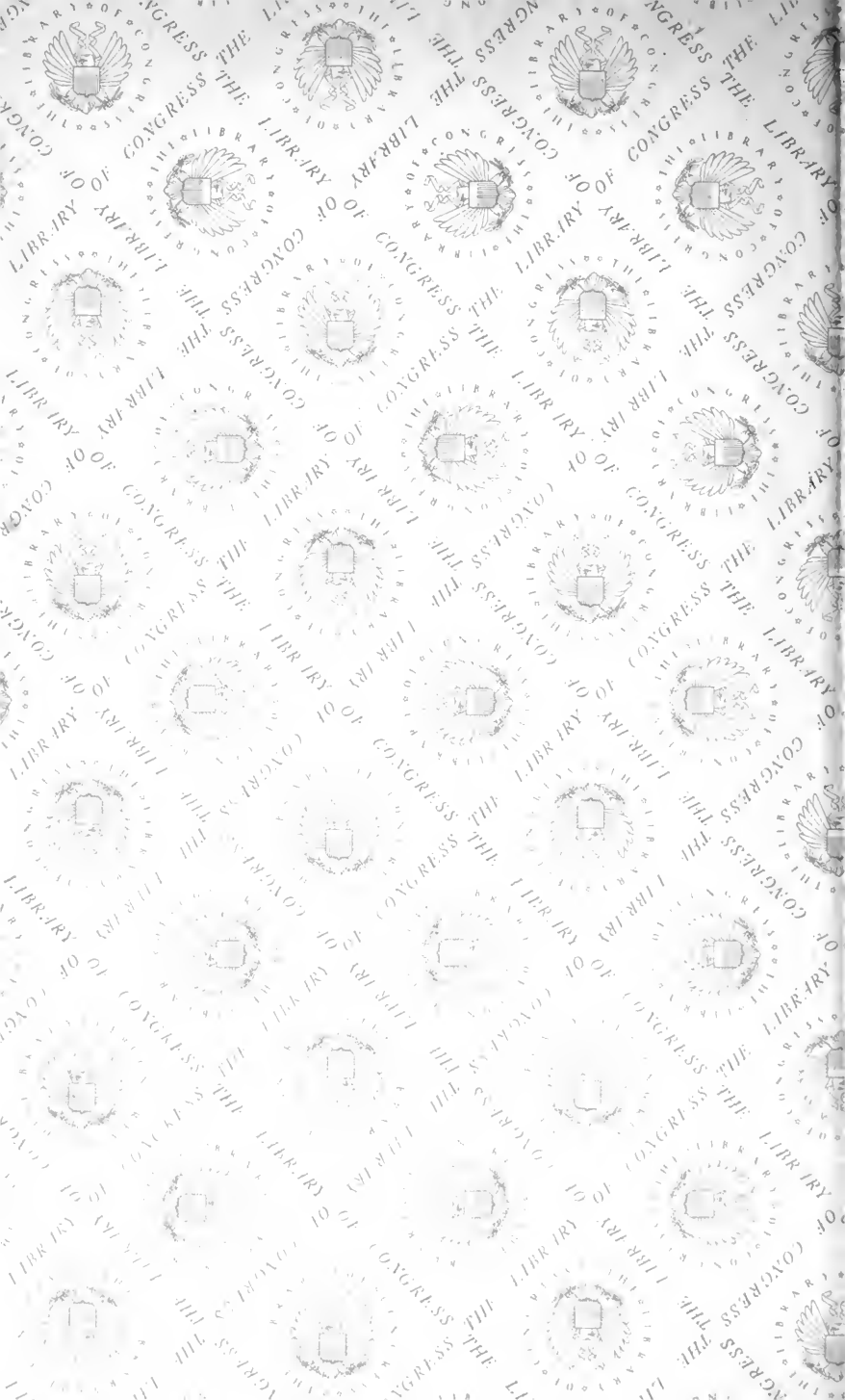
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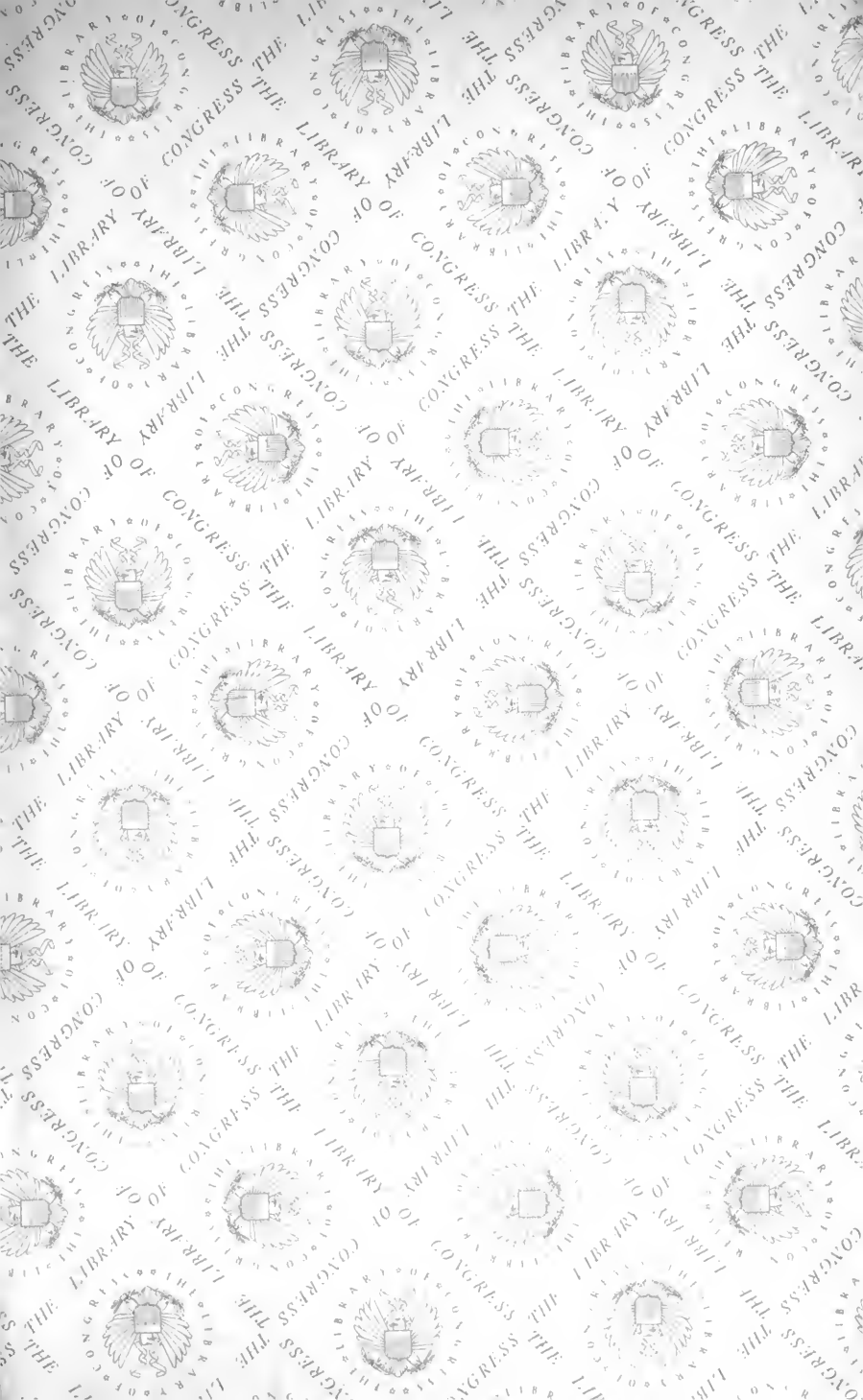
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